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RESEARCH ARTICLE

A Context-Specific Training Programme for Home Based Carers Who Care for People With Diabetes: A Necessity at Ga-Dikgale Village in South Africa

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Abstract:

Introduction:

South Africa, like many countries, has been experiencing an increase in the prevalence of Type 2 Diabetes Mellitus (T2DM) and is amongst the top five countries with a high number of diabetes mellitus cases. Home Based Carers (HBCs) have been involved in the care of people with diabetes because of the need for efficient and cost-effective use of healthcare resources, especially in low-income countries. Previous research showed that HBCs are insufficiently trained in T2DM which leads to low-quality care but also disrespect by patients towards HBCs. The aim of this article was to develop a training program necessary for HBCs who care for People With Diabetes (PWD).

Methods:

Mixed method was used for the main study and both qualitative and quantitative data were collected to serve as a base for this phase. ADDIE model was used to guide the development of the training programme for HBCs.

Results and Discussion:

A context-specific training programme consisting of three modules was developed: (1) Basic knowledge and classification of diabetes mellitus, (2) prevention and control of diabetes and (3) management of diabetes and prevention of complications by HBCs. Development of the training programme was necessary because its availability and training of HBCs will increase disease-specific knowledge.

Conclusion:

This is the first training programme developed for HBCs in this region to address diabetes knowledge training gaps. The training programme might be of assistance to other researchers who may want to train HBCs in their regions.

Keywords: Context-specific, Training programme, Home Based Carers, People With Diabetes, Diabetes Mellitus, Type 2 Diabetes Mellitus.

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1. INTRODUCTION AND BACKGROUND

Type 2 Diabetes Mellitus (T2DM) is common amongst Non-Communicable Diseases (NCDs) globally [1]. The fast-growing number of T2DM globally led to the evolution of numerous and different delivery modes to prevent and manage the condition [2]. Regardless of various and diverse delivery modes to prevent T2DM and T2DM-related complications, the disease continues to be the fourth leading cause of deaths globally [3] and brings a substantial economic loss to people, families and the health systems [4]. Home Based Carers

(HBCs) provide hypertension and diabetic care to members of the affected communities [5]. Shortage of health care workers resulting in ineffective management of diabetes led to the need of HBCs to bring diabetes prevention and management practices to their communities [3].

South Africa, like many countries, is experiencing an increase and it was said to be amongst the top five countries with a high number of diabetes mellitus cases. According to the Statistics of South Africa [6] on mortality and causes of death, diabetes is the second most common cause of deaths in South Africa. HBCs, also known as Community Health Workers (CHWs) have been recognised as an important part of the healthcare team to care for NCDs at the community level. They have been involved in the care of diabetes mellitus because

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there was a need for efficient and cost-effective use of healthcare resources, especially in low-income countries. HBCs involvement in the care of diabetes people at the community level has been found to be a promising approach for improving diabetes health outcomes [7]. HBCs serve as a link between healthcare services and community members because they have unique knowledge, cultural competency and a close relationship with the community [7].

The HBCs in many parts of South Africa are employed by the NGOs which receive funds from the government and they are supervised by professional nurses and coordinators at the Primary Care Level to oversee their daily activities [8]. The study conducted by Abrahams-Gessel, Denman and Montano [9], revealed that HBCs often have poor knowledge about NCDs including diabetes mellitus and their risk factors.

In South Africa, patients lack respect for HBCs because they are not trained [10]. HBCs who care for people with diabetes mellitus need to be capacitated with a structured training and support programme [11]. The utilisation of adequately trained HBCs with ongoing supervision and support to perform clearly defined tasks can be more beneficial for people with NCDs at community level. HBCs without formal training can be trained effectively to screen, prevent and manage People With Diabetes (PWD) [12, 13].

The current article is part of the larger study which was aimed at developing, implementing and evaluating a training programme for HBCs who care for PWD at Ga-Dikgale village in Limpopo province of South Africa. A mixed method approach following convergent parallel design was used during the situational analysis in Phase 1 of the main study to explore and describe practices, knowledge and training needs of HBCs. The overall purpose of this article was to describe the development of a context-specific training programme for HBCs who care for PWD at Ga-Dikgale village in Limpopo province.

2. METHODOLOGY AND DESIGN

In the whole study, the ADDIE model was used to guide the development, implementation and evaluation of a context-specific training programme for HBCs [14]. ADDIE model is a systematic instructional design and abbreviation of the following logical steps: Analysis, Design, Development, Implementation and Evaluation [15].

Implementation and Evaluation [15]. These steps are sequential meaning the output of one step becomes the input for the next step [16]. Furthermore, Wetty [16] indicated that it is an iterative feedback model because the results of the last stage are returned to the point of origin for feedback, to close the loopholes and or to refine the learning product. ADDIE model was followed in this study to ensure that correct steps were followed to develop appropriate learning material in an optimal manner, to meet the needs of the HBCs [17]. This article focusses on the first three steps: analysis, design and development described below and have been used for the development of the training programme as illustrated in Fig. (1). In the last phase of the larger study, the last two steps will be reported on at a later date.

2.1. Step 1. Analysis

The analysis is the first step of ADDIE's model which was used to identify training needs in order to develop the training programme for the HBCs and which formed the basis of all other steps [18]. Needs analysis of diabetes information and education was conducted in the first phase of the study employing a mixed method approach and the results were published elsewhere. The population for this study was all HBCs who care for diabetes patients at Ga-Dikgale village. Fifteen HBCs who were purposively selected because they had diabetic patients under their care volunteered to be interviewed during data collection period to address experiences and learning needs of Home Based Carers (HBCs) who care for diabetic people at Ga-Dikgale village. The total population of 53 HBCs available during data collection and willing to participate, were included in the study and completed the questionnaires which addressed diabetes knowledge HBCs.

2.2. Step 2. Design

The design step is the blueprint of how the training programme was created [19]. The purpose of the designing step is to define the anticipated performance and suitable evaluation methods [15]. In the design step, learning outcomes were identified and formulated with the idea that the success of this training implementation depends on clearly formulated learning outcomes, to meet the needs of HBCs. Based on the learning outcomes, the training content, teaching/learning

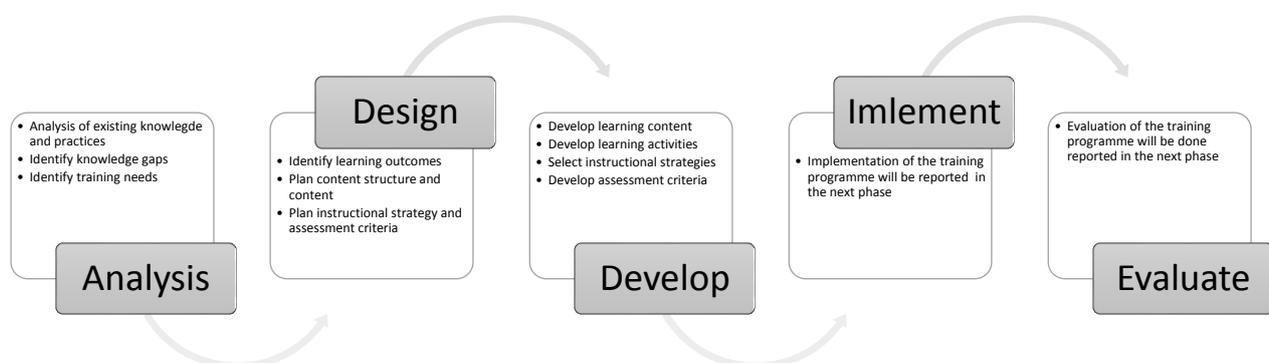


Fig.(1). Summary of activities of the ADDIE model in the development of the training programme.

methods, instructional strategies and assessment criteria were designed.

Two types of the learning outcomes namely; critical cross-field outcomes and specific learning outcomes were formulated in this study. Critical cross fields were adopted from the South African Qualifications Authority (SAQA) [20]. The research team used information gathered from the analysis step (situational analysis) to create a plan to bridge the learning gaps (training needs) identified and developed the specific learning outcomes. SAQA format, which was followed, encompasses the following elements: the name of the training programme, National Qualification Framework (NQF) level, Credits which reflect the average length of time the learner takes to complete learning of which 10 (ten) notional hours equal to 1 (one) credit, purpose of the training programme, duration of the programme, learning assumed to be in place, critical cross-field outcomes, specific outcomes and assessment criteria, Unit standard and programme assessment.

Table 1. Qualitative results.

| | |
|---|---|
| HBCs activities during care of PWD | 1.1 Provide nutritional needs 1.2 Assist with adherence to prescribed treatment (medication support) 1.3 Provide patient-centered care based on their expectations 1.4 Wound dressing |
| HBCs challenges | 1.1 Knowledge gaps 1.2 Beliefs and attitudes of patients 1.3 Context of diabetic patients (poverty, living alone) 1.4 Difficulties to engage nurses |
| HBCs training needs | 1.1 Types of diabetes, signs and symptoms, normal ranges of blood glucose, diabetic diet and complications 1.2 Procedures and tests done during management of diabetes patients 1.3 Different treatment types of treatment given for diabetes 1.4 Wound care |

2.3. Step 3. Development

According to the ADDIE model, the development step is where the researcher creates and assembles the content of the programme assets created in the design phase [21]. The aim of

this step was to create the learning content that incorporates all the learning needs of the HBCs, and also to develop learning materials with learning outcomes that are relevant, legible and reader-friendly for the level of the HBCs. In this step, the structure and content of the training programme including learning activities, instructional and assessment strategies are aligned with developed learning outcomes.

3. RESULTS

In the next paragraphs, this paper presents the steps followed during training programme development guided by the ADDIE model.

3.1. Step 1. Analysis

Based on the knowledge questionnaire used in the first phase, of the major study the following knowledge gaps in relation to care and management for PWD were identified: definition of condition, types of diabetes mellitus, age group mostly affected Type 2, ideal range for normal and abnormal blood glucose levels, signs and symptoms, diabetic diet, prevention and control and complications and management of diabetic complications [22]. The results obtained from the qualitative part of the study indicated the HBCs' activities during the provision of care, challenges experienced and training needs, whereby they have suggested the training topics during interviews [23] (Table 1).

The gaps identified from the quantitative results were supported by the training topics suggested by the HBCs during the interview sessions conducted. The full situational analysis results for the current training programme of HBCs have been obtained and is/will be reported elsewhere.

3.2. Step 2. Design

The design of the training programme is presented in Table 2. The care and management of people with diabetes training programme were designed as a 16 hours workshop which was divided into two eight hours session per day. The training programme was at Level 4 of the National Qualification Framework (NQF) with 11/2 credits. The contact sessions were divided into two for two groups of HBCs for interactive facilitation with different facilitators who were a professional nurse (researcher), a dietician, pharmacist and the psychologist.

Table 2. The design of the training programme.

| | |
|---|--|
| Course: Care and management of diabetes people by HBC | Contact hours: 16hours (Two 8 hours session per day) Credits: 11/2 NQF Level: 4 Venue: Bolivia Lodge |
| Duration of the course | Two training days (to be able to use interactive facilitation) |
| Pre-requisites Learning assumed to be in place | <ul style="list-style-type: none"> • Basic Life skills • Basic Communication skills at the community level • Basic Interpersonal Relationship at the community level |
| Co-requisites Units of learning contributing during the course | <ul style="list-style-type: none"> • A Home Based Carer • Able to read, write and communicate • Having been an HBC at Ga-Dikgale village taking care of Type2 diabetes patients |

(Table 2) contd.....

| | |
|--|--|
| Course facilitator | Professional nurse Dietician Pharmacist Psychologist |
| Purpose of the course | The overall purpose of the course is to equip and enhance HBCs' skills and knowledge with regard to activities that are involved in the care of people with diabetes in the community. |
| Critical cross-field outcomes Course learners will be able to: | |
| <ul style="list-style-type: none"> a) Identify and solve problems related to Diabetes Mellitus (DM) b) Work effectively with others as a member of a team and community towards changing their behaviour. c) Organize and manage oneself and one's activities responsibly and effectively when using the principles of learning to facilitate change. d) Collect, analyze, organise and critically evaluate information better understand and explain by selecting the relevant subject matter for imparting to communities e) Communicate effectively using visual and language skills either orally or written when communicating effectively with individuals and groups regarding risk behaviour and change f) Use science and technology effectively and critically when gathering and providing information to individuals and communities g) Recognize that problem-solving contexts do not exist in isolation and work as a team member of the multidisciplinary healthcare team. | |
| Course outline: Upon completion of this course, the Home Based Carers as learners should be able to achieve the following Specific Learning Outcome (SLO1, 2, 3, 4, 5 and 6): | |
| <ul style="list-style-type: none"> 1. Demonstrate understanding of the basic knowledge with regard to diabetes mellitus (SLO1) 2. Explain risk factors and signs and symptoms of diabetes mellitus (SLO2) 3. Educate and support diabetes mellitus people about healthy lifestyle (SLO4) 4. Describe the management of diabetes mellitus and treatment adherence (SLO4) 5. Explain the prevention and care of complications of diabetes mellitus (SLO5) 6. Demonstrate a positive attitude when dealing People with diabetes (SLO6) | |

The venue for the workshop was away from their work environment because work-related interruptions were avoided. The pre-requisites for this course were basic life skills, basic communication skills and basic interpersonal relationship at the community level. The training also had a corequisite for training namely; a Home Based Carer, able to read, write and communicate and has been an HBC at Ga-Dikgale village taking care of Type 2 diabetes patients.

The researcher formulated clear and precise learning outcomes using Bloom's Taxonomy to classify the following levels of learning: remember, understand, apply, analyse, evaluate and create [24], so that the learner has no doubt about

what was expected (Table 2). Critical cross-field outcomes which express qualities that should be achieved in all qualifications and Specific Learning Outcomes to address the participants' needs and requirements were formulated [20].

Content is the focal point for engaging the HBCs during the process of knowledge construction. The researcher determined the content that was consistent with the learning outcomes. Based on the learning outcomes, the researcher designed a training content which consisted of three modules: (1) basic knowledge and classification of diabetes mellitus, (2) prevention and control of diabetes and (3) management of diabetes and prevention of complications by HBCs. The modules also have units which are presented in Table 3.

Table 3. Content of the modules in the programme.

| MODULE | STUDY UNIT | CONTENT |
|--|--|--|
| Module 1: Basic knowledge and classification related to diabetes mellitus | Study unit 1.1: Description of diabetes mellitus and its classification | <ul style="list-style-type: none"> ▪ Concepts used for Diabetes mellitus and care <ul style="list-style-type: none"> ▪ Normal regulation of blood glucose ▪ Types of diabetes mellitus ▪ Clinical difference between diabetes type 1 and type 2 |
| | Study unit 1.2: Risk factors and sign and symptoms of diabetes | <ul style="list-style-type: none"> ▪ Signs and symptoms of diabetes mellitus ▪ Risk factors of diabetes mellitus |
| Module 2: Prevention and control of diabetes | Study unit 2.1 Promotion of healthy lifestyle | <ul style="list-style-type: none"> ▪ Early detection of diabetes by FINDRISK tool) <ul style="list-style-type: none"> ▪ Healthy diets ▪ Healthy food guide pyramid ▪ Plate model ▪ Role of physical activity in the prevention of diabetes <ul style="list-style-type: none"> ▪ Physical activities for diabetic patients <ul style="list-style-type: none"> ▪ Benefits of losing weight ▪ Avoidance of alcohol ▪ Avoidance of tobacco use |
| Module 3: Management of diabetes and prevention of complications by HBCs | Study unit 3:1 Management of diabetes | <ul style="list-style-type: none"> ▪ Measures by HBCs to manage diabetes mellitus ▪ Role of HBCs in assisting adherence to diabetic treatment ▪ Knowledge of glucose testing and to assist diabetic patients on treatment |

(Table 3) contd....

| MODULE | STUDY UNIT | CONTENT |
|--------|--|---|
| | Study unit 3: 2 Complications of diabetes mellitus and care provision by HBCs | <ul style="list-style-type: none"> ▪ Complications of diabetes mellitus. ▪ Hypoglycaemia, signs and symptoms, causes and prevention ▪ Diabetic foot problems, prevention of foot ulcer and amputation and wound dressing ▪ Management and care of complications by HBCs |

3.3. Step 3. Development of the Training Programme

Learning materials that covered all the SLO were designed at this stage. During the design of the learning materials, the researcher considered the competency level of the HBCs. The training materials were drafted first and then submitted for evaluation for representativeness, appropriateness, completeness and importance to the research supervisors, psychologists, dieticians and pharmacists before a final version was concluded. The psychologists, dieticians and Pharmacists were included because they formed part of the implementation of this training programme.

3.4. Content Development

The researcher considered the following aspects during content development: the relevancy of the content included in the specific learning outcomes and objectives to achieve the SLO. The process of preparing the content was based on interviews conducted during data collection and reviewed literature related to diabetes mellitus and published books [25]. The researcher developed the content that matches the learning outcomes identified in the design step. The content was divided into three modules in line with the SLO. The first module was for basic knowledge and classification related to diabetes which was divided into units. Each unit has different content and further divided into sub-units. Table 3 gives an overview of the different modules of the training program.

3.5. Instructional Strategies

Learner-centered and problem orientated strategies were the guiding framework for accomplishing the learning outcomes. The researcher selected the instructional strategies that accommodated individual learner's rates of learning and learning style based on reviewed literature. The instructional strategies selected were lecturer's method, discussion, active learning, and cooperative learning/group discussions, role plays and case-based exercises [26].

3.6. Assessment Criteria

The strategies for assessment were developed at this stage in order to measure success gained from the developed programme. Assessment would be undertaken continuously throughout the implementation of the training as it is interlinked with all the activities. The researchers would use formative assessment strategies such as open-ended questions, group discussions, and peer assessment to assess the understanding of the HBCs and achievement of the learning outcomes during the workshop. In this context, the researcher formulated assessment questions at the end of every activity to assess comprehension of the content in relation to the learning outcomes of the specific unit. The assessment criteria are presented in Table 4.

Table 4. Specific learning outcomes and assessment criteria.

| Specific LEARNING OUTCOME | ASSESSMENT CRITERIA The participant will be able to |
|--|---|
| 1. Demonstrate understanding of basic knowledge with regard to diabetes mellitus | <ul style="list-style-type: none"> ▪ Define the following concepts related to diabetes mellitus: diabetes mellitus, blood glucose, insulin, pancreas, hyperglycaemia and hypoglycaemia <ul style="list-style-type: none"> ▪ Describe normal regulation of blood glucose ▪ Name and explain the classification of diabetes mellitus ▪ Outline the clinical differences between diabetic mellitus type 1 and type 2 |
| 2. Explain risk factors and signs and symptoms of diabetes mellitus | <ul style="list-style-type: none"> ▪ Identify and describe signs and symptoms of diabetes mellitus ▪ Identify and describe risk factors of diabetes mellitus |
| 3. Educate and support diabetes mellitus people about healthy lifestyle | <ul style="list-style-type: none"> ▪ Describe the importance of early detection in diabetes mellitus ▪ Explain how to use FINDRISK TOOL to identify people at risk of developing diabetes mellitus Describe the healthy diets <ul style="list-style-type: none"> ▪ Explain diet that needs to be followed by diabetes people ▪ Explain healthy food guide pyramid and plate model ▪ Describe the role/benefits of physical activity/exercise in the prevention and management of diabetes ▪ List the examples of simple physical activities/exercises diabetic patients can engage in <ul style="list-style-type: none"> ▪ Describe the danger of alcohol on diabetes mellitus ▪ Describe the effects of smoking on diabetes mellitus |
| 4. Describe the management of diabetes mellitus and treatment adherence | <ul style="list-style-type: none"> ▪ Describe measures to be followed in management of diabetes <ul style="list-style-type: none"> ▪ Describe adherence to diabetic treatment ▪ Explain glucose testing |
| 5. Explain the prevention and care of complications of diabetes mellitus | <ul style="list-style-type: none"> ▪ List and explain the complications of diabetes mellitus. ▪ Describe management of mild and severe hypoglycaemia <ul style="list-style-type: none"> ▪ Outline general principles for foot care ▪ Describe management and care of complications by HBCs |

3.7. Training Materials

The training materials developed included hard copies of training manuals printed for each HBC and the power point slides which covered all the SLO.

4. DISCUSSION

The study aimed at developing a training programme for HBCs who care for diabetes mellitus people at Ga-Dikgale village in the Limpopo Province of South Africa. It led to the design and development of a context-specific training programme for HBCs who care for diabetic people at Ga-Dikgale villages. This is the first training programme which was developed on the care of PWD in this context targeting the HBCs. The programme developed marks the beginning of the journey to strengthen the performance of HBCs in the provision of services to diabetes mellitus patients .

Instructional design system following the ADDIE model provided practical steps for organising a training development project. According to Branch [15], ADDIE's model describes and prescribes what needs to happen during the process. The analysis, design and development were the only three steps followed at this phase. In consistent with the literature reviewed, the model was helpful because it is process-based and follows a systemic problem-solving approach that provided well-defined basic and easy to follow steps [14, 27 - 29].

The situational analysis provided an opportunity to complete a thorough analysis of HBCs' training needs that guided the designing and the development of the training programme. Major knowledge gaps and training topics were suggested and served as a foundation for specifying the learning outcomes, content and activities, instructional strategies and assessment strategies. In support of this, other studies conducted in Western Nepal and South Africa, respectively, indicated that the knowledge gaps were identified through assessment in order to develop training [29, 30]. In congruence with other findings Tsolekile, Schneider and Puoane [11] reported that HBCs basic knowledge about diabetes is poor and it needs to be improved for community-based diabetes management to be successful. The benefit of using this model is that it permitted the researcher to refer and revisit previous steps during the process.

The design of the training programme was based on SAQA guidelines [20], even though HBCs have no professional body that regulates their training. The HBCs have a job description that describes their activities for caring for people with chronic conditions that is context specific and is developed by NGOs managers. The designing of the training must be based on SAQA because it was established to create a single, integrated, national education and training framework for the whole nation, and to improve the quality of education and training in South Africa [31]. The adaptation of the SAQA standards format for guiding the design of the training programme was helpful in the planning of it.

Development of the training programme was necessary because it's availability and training of HBCs will increase disease-specific knowledge and this was supported by other studies like diabetes training of community health workers serving native Hawaiians and Pacific people [32]. The utilisation of ADDIE's model of instructional design in the development of the training programme benefited both the quality of the training content, teaching strategies, and

assessments methods. The training content developed was based on the topics suggested by the HBCs during the interviews as emerged form themes after data analysis and the activities of HBCs during provision of care to PWD, and this was supported by the literature [25].

The next phase in our study is the implementation of the training programme and evaluation of the effectiveness of the training programme. The evaluation would make it possible to establish the impact of the training programme.

5. LIMITATIONS OF THE STUDY

The stakeholders NGOs managers for HBCs, diabetic people, nurses from the clinics and community members were not involved during the situational analysis to assess the task performance of the leaners, who according to the ADDIE model, should have been involved, which is a limitation of this study. However, the results obtained from the needs assessment revealed enough clarity on the performance gap and learning needs to base our decision for developing the training programme. Although HBCs' performance gap and learning needs were enough for a basic training programme, further exploration of the stakeholders' perspectives at a later stage is suggested for more advanced training opportunities.

CONCLUSION

This paper concentrated on the development of a context-specific training programme. The first three steps of the ADDIE model (analysis, design and development) used as a guide and the program was successfully developed for the HBCs who care for PWD. The training programme developed consisted of three modules targeting learning outcomes: (1) basic knowledge and classification related to diabetes mellitus, (2) prevention and control of diabetes and (3) management of diabetes and prevention of complications by HBCs which will be facilitated within two sessions lasting for 16 hours each. The training material and assessment criteria were also developed. This is the first training programme developed for the HBCs in this region to address diabetes knowledge training gaps. The training programme might be of assistance to other researchers who may want to train HBCs in their regions. The training programme will be implemented and evaluated in the next phase.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance for this study was obtained from the Turfloop Research Ethics Committee (TREC) at the University of Limpopo (TREC/76/2016: PG). Permission to conduct the study was obtained from the Limpopo province Department of Health and from HBCs organisations managers.

HUMAN AND ANIMAL RIGHTS

No animals were used in this research. All human research procedures followed were in accordance with the ethical standards of the committee responsible for human experimentation (institutional and national), and with the Helsinki Declaration of 1975, as revised in 2013.

CONSENT FOR PUBLICATION

Informed consent was obtained from the participants prior to data collection.

AVAILABILITY OF DATA AND MATERIALS

The data sets used during this study are available on request for the readers from the corresponding authors.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest, financial or otherwise.

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Declared none.

REFERENCES

- [1] World Health Organisation. Non-communicable Diseases Progress Monitor 2015. Geneva: WHO 2015.
- [2] Hill J, Peer N, Oldenburg B, Kengne AP. Roles, responsibilities and characteristics of lay community health workers involved in diabetes prevention programmes: A systematic review. *PLoS One* 2017; 12(12):e0189069 [http://dx.doi.org/10.1371/journal.pone.0189069] [PMID: 29216263]
- [3] Alaofo H, Asaolu I, Ehiri J, *et al.* Community health workers in diabetes prevention and management in developing countries. *Ann Glob Health* 2017; 83(3-4): 661-75. [http://dx.doi.org/10.1016/j.aogh.2017.10.009] [PMID: 29221543]
- [4] WHO. Global report on diabetes. Geneva, Switzerland: WHO Press 2016.
- [5] Spencer MS, Rosland A-M, Kieffer EC, *et al.* Effectiveness of a community health worker intervention among African American and Latino adults with type 2 diabetes: a randomized controlled trial. *Am J Public Health* 2011; 101(12): 2253-60. [http://dx.doi.org/10.2105/AJPH.2010.300106] [PMID: 21680932]
- [6] Statistics South Africa Report on mortality and causes of death 2016. www.statssa.gov.za/publications/P03093/P030932016.pdf
- [7] Shah M, Kaselitz E, Heisler M. The role of community health workers in diabetes: update on current literature. *Curr Diab Rep* 2013; 13(2): 163-71. [http://dx.doi.org/10.1007/s11892-012-0359-3] [PMID: 23345198]
- [8] Tsolekile L P, Puoane T, Schneider H, Levitt N S, Steyn K. The roles of community health workers in the management of non-communicable diseases in an urban township *Afr J Prim Health Care Fam Med* 2014; 6(1) Art. 693, 8 pages [http://dx.doi.org/10.4102/phcfm.v6i1.693]
- [9] Abrahams-Gessel S, Denman CA, Montano CM, *et al.* The training and fieldwork experiences of community health workers conducting population-based, noninvasive screening for CVD in LMIC. *Glob Heart* 2015; 10(1): 45-54. [http://dx.doi.org/10.1016/j.ghcart.2014.12.008] [PMID: 25754566]
- [10] Maimela E, Van Geertruyden JP, Alberts M, *et al.* The perceptions and perspectives of patients and health care providers on chronic diseases management in rural South Africa: A qualitative study. *BMC Health Serv Res* 2015; 15: 143. [http://dx.doi.org/10.1186/s12913-015-0812-5] [PMID: 25880727]
- [11] Tsolekile LP, Schneider H, Puoane T. The roles, training and knowledge of community health workers about diabetes and hypertension in Khayelitsha, Cape Town. *Curationis* 2018; 41(1): e1-8. [http://dx.doi.org/10.4102/curationis.v41i1.1815] [PMID: 29781697]
- [12] Gaziano TA, Abrahams-Gessel S, Denman CA, *et al.* An assessment of community health workers' ability to screen for cardiovascular disease risk with a simple, non-invasive risk assessment instrument in Bangladesh, Guatemala, Mexico, and South Africa: An observational study. *Lancet Glob Health* 2015; 3(9): e556-63. [http://dx.doi.org/10.1016/S2214-109X(15)00143-6] [PMID: 26187361]
- [13] Abdel-All M, Putica B, Praveen D, Abimbola S, Joshi R. Effectiveness of community health worker training programmes for cardiovascular disease management in low-income and middle-income countries: a systematic review. *BMJ Open* 2017; 7(11):e015529 [http://dx.doi.org/10.1136/bmjopen-2016-015529] [PMID: 29101131]
- [14] Chen Y, Chen T, Tsai L. Development and evaluation of multimedia reciprocal representation instruction materials. *Int J Phys Sci* 2011; 6(6): 1439. [http://dx.doi.org/10.5897/IJPS11.066]
- [15] Branch RM. *Instructional Design: The ADDIE approach*. Springer Science and Business Media, LLC 2009. [http://dx.doi.org/10.1007/978-0-387-09506-6_2]
- [16] Wetty G. The Design Phase of the ADDIE model. *Journal of GXP Compliance* 2007; 11(4): 40-8.
- [17] Piskurich GM. *Rapid Instructional Design: Learning ID Fast and Right*. 3rd ed. Hoboken, NJ, USA: John Wiley and Sons 2015. [http://dx.doi.org/10.1002/9781119207528]
- [18] Akkoyunlu B, Arkün S. A Study on the development process of a multimedia learning environment according to the ADDIE model and students' opinions of the multimedia learning environment *Interactive Educational Multimedia* 2008; 17: 1-19.
- [19] Cheung L. Using the ADDIE Model of instruction to Teach Chest Radiograph Interpretation. *J Biomed Educat* 2016; Article ID 95025726 pages. [http://dx.doi.org/10.1155/2016/9502572]
- [20] South African Qualifications Authority (SAQA) 2005. www.saqa.org.za/docs/pol/2015/National%20Policy%20for%20Assessment
- [21] Niari M, Hartofylaka A M. *Instructional Design of the WaW e-courses*. *J Open Distance Edu Educat Technol* 2017; 13(2) [http://dx.doi.org/10.12681/jode.15274]
- [22] Bopape M, Mothiba T, Mutambudzi M, Wens J, Bastiaens J. Baseline assessment of knowledge of home based carers for people with diabetes in a rural village in south africa: A quantitative study. *TOPHJ* 2002; 12: 199-205. [http://dx.doi.org/10.2174/1874944501912010199]
- [23] Bopape MA, Mothiba TM, Bastiaens H. What Are the Experiences and Training Needs of Home-Based Carers in Dealing With Diabetes in a Rural Village in South Africa? An Explorative Study. *Global Journal of Health Science* 2019; 11(3): 52-62. [http://dx.doi.org/10.5539/gjhs.v11n3p52]
- [24] Krathwohl DR. A Revision of Bloom's Taxonomy: An Overview. *Theory into Practice* 2002; 41:4: 212-8. [http://dx.doi.org/10.1207/s15430421tip4104-2]
- [25] Hsu T, Lee-Hsieh J, Michael A, Turton MA, Cheng S. Using the ADDIE Model to Develop Online Continuing Education Courses on Caring for Nurses in Taiwan. *The Journal of Continuing Education in Nursing* 2019. [http://dx.doi.org/10.3928/00220124-20140219-04]
- [26] Gleason BL, Peeters MJ, Resman-Targoff BH, *et al.* An active-learning strategies primer for achieving ability-based educational outcomes. *Am J Pharm Educ* 2011; 75(9): 186. [http://dx.doi.org/10.5688/ajpe759186] [PMID: 22171114]
- [27] He Z, Marquard J, Henneman E. Model guided design and development process for an electronic health record training program. *AMIA Annu Symp Proc* 2017; 2016: 1814-21. [PMID: 28269940]
- [28] Hess A K N, Greer K. Designing for Engagement: Using the ADDIE model to integrate High-Impact Practices into online Information Literacy Course. *Commun Info lit* 2016; 10(2)
- [29] Malan Z, Mash B, Everett-Murphy K. Development of a training programme for primary care providers to counsel patients with risky lifestyle behaviours in South Africa. *Afr J Prim Health Care Fam Med* 2015; 7(1) [http://dx.doi.org/10.4102/phcfm.v7i1.819]
- [30] Gyawali B, Mishra SR, Neupane D, Vaidya A, Sandbæk A, Kallestrup P. Diabetes management training for female community health volunteers in Western Nepal: An implementation experience. *BMC Public Health* 2018; 18(1): 641. [http://dx.doi.org/10.1186/s12889-018-5562-y] [PMID: 29783961]
- [31] Bezuidenhout M, Human S, Lekhuleni M. The new nursing qualifications framework Trends in nursing 2013; 1(1) <http://fundisa.journals.ac.za>. [http://dx.doi.org/10.14804/1-1]
- [32] Look MA, Baumhofer NK, Ng-Osorio J, Furubayashi JK, Kimata C. Diabetes training of community health workers serving native Hawaiians and Pacific people. *Diabetes Educ* 2008; 34(5): 834-40.