


# An evaluation of self-management outcomes among chronic care patients in community home-based care programmes in rural Malawi: A 12-month follow-up study

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## Funding information

This work was supported by funding from the European Commission, through the Erasmus Mundus Joint Doctorate Fellowship, Specific Grant Agreement 2015-1595, awarded to VA (Vibian Angwenyi). JVL is supported by a Spanish Ministry of Science, Innovation and Universities Miguel Servet grant (Instituto de Salud Carlos III/ESF, European Union [CP18/00074]) and further acknowledges support from the Spanish Ministry of Science, Innovation and Universities through the 'Centro de Excelencia Severo Ochoa 2019-2023' Programme (CEX2018-000806-S), and from the Government of Catalonia through the CERCA Programme. The funders had no role in the study design, data collection and analysis, decision to publish or preparation

## Abstract

This paper investigates the impact of community home-based care (CHBC) on self-management outcomes for chronically ill patients in rural Malawi. A pre- and post-evaluation survey was administered among 140 chronically ill patients with HIV and non-communicable diseases, newly enrolled in four CHBC programmes. We translated, adapted and administered scales from the Stanford Chronic Disease Self-Management Programme to evaluate patient's self-management outcomes (health status and self-efficacy), at four time points over a 12-month period, between April 2016 and May 2017. The patient's drop-out rate was approximately 8%. Data analysis included descriptive statistics, tests of associations, correlations and pairwise comparison of outcome variables between time points, and multivariate regression analysis to explore factors associated with changes in self-efficacy following CHBC interventions. The results indicate a reduction in patient-reported pain, fatigue and illness intrusiveness, while improvements in general health status and quality of life were not statistically significant. At baseline, the self-efficacy mean was 5.91, which dropped to 5.1 after 12 months. Factors associated with this change included marital status, education, employment and were condition-related; whereby self-efficacy for non-HIV and multimorbid patients was much lower. The odds for self-efficacy improvement were lower for patients with diagnosed conditions of longer duration. CHBC programme support, regularity of contact and proximal location to other services influenced self-efficacy. Programmes maintaining regular home visits had higher patient satisfaction levels. Our findings suggest that there were differential changes in self-management outcomes following CHBC interventions. While self-management support through CHBC programmes was evident, CHBC providers require continuous training, supervision and sustainable funding to strengthen their contribution. Furthermore, sociodemographic and condition-related factors should inform the design of future interventions to optimise outcomes. This study provides a systematic evaluation of self-management outcomes for a heterogeneous chronically

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of the manuscript.

ill patient population and highlights the potential and relevant contribution of CHBC programmes in improving chronic care within sub-Saharan Africa.

#### KEYWORDS

community home-based care, HIV, Malawi, non-communicable diseases, patient self-management, self-efficacy, survey

## 1 | INTRODUCTION

The growing population of patients with chronic conditions globally calls for a shift in how healthcare is organised and provided, particularly in low-income countries. The long-term nature of chronic conditions requires patients to take up a central role in the day-to-day management of these conditions with support from healthcare providers, family members and community caregivers (Holman & Lorig, 2000). Self-management is a process through which patients together with their caregivers are involved in the management of the symptoms, treatment, lifestyle changes and psychosocial consequences of their health condition (Lorig & Holman, 2003; Miller, Lasiter, Ellis, & Buelow, 2015; Richard & Shea, 2011). Self-management processes are influenced by a multitude of factors, both internal and external to a patient's environment. Factors broadly fall into patient level characteristics, condition-related characteristics and access to resources in patients' environments, including social support and healthcare (Schulman-Green, Jaser, Park, & Whittemore, 2016). For patients to self-manage well, they require access to support resources to harness their skills and knowledge. Although different chronic conditions may require specific self-management skills, there have been proposals for the need to establish interventions designed to span across different care dimensions (Swendeman, Ingram, & Rotheram-Borus, 2009).

The Stanford Chronic Disease Self-Management Programme (CDSMP) and the United Kingdom Expert Patient Programme are examples of self-management programmes with a holistic focus targeting patients with different chronic conditions, delivered by trained lay leaders or peer patients with some support from healthcare professionals (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002; Lorig et al., 2001; Swendeman et al., 2009). Such programmes are grounded on the self-efficacy theory and have served as model interventions for empowering patients' self-management capacities (Lorig et al., 2001). Self-efficacy refers to the confidence a person has in their capacity to undertake certain behaviour(s) that can lead to desired outcomes (Bandura, 1977). Given the behaviour-specific trait of self-efficacy, it can be altered or enhanced through self-management support. Studies and reviews evaluating such self-management support initiatives demonstrate significant, though varied, improvements in patient outcomes like symptom monitoring, physical well-being, psychological functioning and social relations (Aantjes, Quinlan, & Bunders, 2014; Barlow et al., 2002; Foster, Taylor, Eldridge, Ramsay, & Griffiths, 2007; Griffiths et al., 2005; Swendeman et al., 2009). However, most of these studies originate

### What is known about this topic

- Chronically ill patients require support and access to materials, information and cognitive resources to facilitate their capacity to self-manage their conditions.
- Self-management support is provided by healthcare professionals, family members and lay/informal caregivers in Community Home-Based Care (CHBC) programmes.
- Existing evidence demonstrates how established self-management programmes, mostly from Western settings, influence self-management outcomes. However, there is a need to understand the potential contribution of CHBC programmes in chronic care in sub-Saharan African settings.

### What this paper adds

- CHBC providers' regular home visits and longer exposure to CHBC activities positively influenced patients' perceived self-efficacy.
- In rural Malawi, the differential access to self-management resources for HIV and non-HIV patients influenced self-management outcomes, with HIV patients faring better.

from high-income settings with limited evidence from sub-Saharan Africa.

Sub-Saharan Africa (sSA) faces a double burden of HIV and non-communicable diseases (NCDs). NCDs such as cardiovascular diseases, diabetes and cancer are projected to account for 70% of deaths by 2030 (Dalal et al., 2011; Mathers & Loncar, 2006). The associated costs for long-term care will exert enormous pressure on government health budgets facing domestic funding challenges and exacerbate dependency on donor funding for health (Geldsetzer, Ortblad, & Barnighausen, 2016; Marquez & Farrington, 2013). Existing self-management support initiatives for patients with chronic conditions in this region are mainly drawn from HIV models of care (Bemelmans et al., 2014; Decroo, Van Damme, Kegels, Remartinez, & Rasschaert, 2012; Lazarus, Safreed-Harmon, Nicholson, & Jaffar, 2014; Wools-Kaloustian et al., 2009), and have accumulated valuable lessons for the provision of long-term care within and beyond health facility settings (Wringe, Cataldo, Stevenson, & Fakoya, 2010). There is growing

evidence on how this knowledge is being utilised to serve patients with chronic NCDs (Khabala et al., 2015; Van Olmen et al., 2015) such as in Community Home-Based Care (CHBC) programmes. These programmes were established early on in the HIV/AIDS epidemic to offer HIV patients support and over time, evolved to extend support to other chronically ill patients, in contexts of constrained healthcare provision and critical health workforce shortages (Aantjes, Quinlan, et al., 2014). This inadvertently led to lay caregivers taking on more responsibilities in the community and patients' homes. CHBC thus became an important delivery platform for chronic care in the region and more entrenched in local health system structures (Aantjes, Quinlan, et al., 2014; Leon et al., 2015; Wringe et al., 2010).

For patients, CHBC constitutes an important community resource allowing access to a range of services such as close home-monitoring, psychosocial support and informational resources. However, provision of CHBC is compromised due to decreased support from donor agencies, which traditionally supported CHBC programmes, and little advancement in government-led health strategies which provide them with the financial support necessary to remain functional (Leon et al., 2015; Schneider & Lehmann, 2016). Investments in the provision of chronic care and self-management support at the community level should preferably be guided by locally generated evidence, especially given the rising numbers of chronically ill patients in SSA. Research within this context has mainly examined the impact of CHBC support on behavioural and clinical outcomes such as retention in care and treatment adherence (Wouters, Van Damme, van Rensburg, Masquillier, & Meulemans, 2012), and on patients' perceived experiences with self-management support (Dube, Rendall-Mkosi, Van den Broucke, Bergh, & Mafutha, 2017; Martin, Kiwanuka, Kawuma, Zalwango, & Seeley, 2013; Russell et al., 2016). Thus, expanding this evidence base requires the application of measures which encompass a broader set of self-management outcomes. Furthermore, utilising instruments adapted for use in an SSA context is desirable.

## 1.1 | Aim and research questions

The study aim was to investigate whether participation and exposure to CHBC support initiatives have any impact on self-management outcomes for patients living with chronic conditions in rural Malawi. The research questions were:

1. Are there changes in self-management outcomes (health status and self-efficacy) for patients receiving support from CHBC providers after 12 months of follow-up?
2. Which factors are associated with self-efficacy changes and improvements at different time points?
3. To what extent does self-management support influence the self-efficacy of patients living with chronic conditions?

## 2 | METHODS

### 2.1 | Study design

A pre- and post-evaluation survey designed to assess changes in self-management outcomes (health status and self-efficacy) was administered at four time points within 12 months, among patients with chronic conditions newly enrolled in CHBC programmes at the time of the baseline survey.

### 2.2 | Study setting and CHBC programme description

This study was conducted in Phalombe, a rural district located south-east of Malawi near the Mozambican border, with a population estimate of 390,000 (in 2017). Phalombe's main ethnic groups are the Lomwes (80%), the Mang'anja (15%) and the Yao (3%) (Malawi Ministry of Health, 2013). The district is characterised by high poverty and unemployment levels, while farming and small-scale trading are the main economic activities.

In Malawi, chronic care services are provided through a three-tier structure of primary, secondary and tertiary health facilities that are linked through a referral system (Government of Malawi, 2017). There are 13 primary healthcare (PHC) facilities mainly served by nurses, medical assistants and health surveillance assistants (HSAs). With the absence of a government-owned hospital, some secondary care is provided in a district government health centre, but referrals from PHC facilities are largely directed to a mission hospital. Within communities, community health volunteers (CHVs) provide support and care to chronically ill patients. Typically, CHVs function within CHBC programmes led by community/faith-based organisations (CBO/FBOs) and undergo training based on nationally approved guidelines (Government of Malawi, 2011).

In Phalombe, and as part of a larger study (Angwenyi, Aantjes, Bunders-Aelen, Lazarus, & Criel, 2019), we identified and purposefully selected five CBO/FBOs based on their previous exposure to a pilot project implemented between 2013 and 2015, which focused on strengthening CHBC providers capacity in delivering community-based chronic care for HIV and NCD patients. Volunteers in the CBO/FBO-led programme generally possessed a basic level of education and were able to read and write in the local language *Chichewa*. At the inception of the pilot project, CBO/FBO volunteers attended a 10-day initial training on home-based care based on the national curriculum (Government of Malawi, 2011), covering aspects such as basic nursing, counselling patients on HIV prevention and nutrition, treatment of opportunistic infections, palliative care support, treatment monitoring and how to conduct home visits. Furthermore, they were trained in the identification and provision of care support to other chronically ill patients and vulnerable groups, and in engaging patients and family members in care-giving. After this training, CBO/FBO volunteers organised

**TABLE 1** Characteristics of the five selected CHBC programmes

Main features	FBO (A)	CBO (B)	CBO (C)	CBO (D)	FBO (E) <sup>a</sup>
Year established	1996	2006	2008	2009	2005
Accessibility and distance from the district headquarters; proximity to nearest health facility	At the district headquarters (sublet office within church premise and near private hospital)	>50 km, poor road access (own office, 7 km from PHC facility). Near CBO B	>55 km, poor road access (own office, very near PHC facility). Near CBO C	>40 km, along main highway (own office land, 10 km from CHAM PHC)	>30 KM, near main highway (sublet office within church premise and near private health centre)
Linked health facility	Private hospital and public referral health centre	Public health centre	Public health centre	Private health centre	Private health centre
Villages covered (population size)	12 (9,198)	6 (6,889)	9 (6,196)	7 (6,321)	6 (4,697)
No. of active community health volunteers	51	52	32	29	22
Linked patient support groups	4	1	3	2	2
No. of chronic patients (total beneficiaries)	326 (618)	91 (538)	242 (500)	133 (499)	42 (270)
CBO/FBO thematic areas	HIV/AIDS; CBCC; OVC; HBC; Safe motherhood; Hygiene and sanitation; Elderly and Disabled; Human and child rights; youth; gender; environment/climate change and agriculture; livelihood support				

Abbreviations: CBCC: community-based childcare centres; CBO: community-based organisation; FBO: faith-based organisation; HBC: Home-based care; OVC: orphans & vulnerable children.

<sup>a</sup>FBO E had stopped recruiting new clients to their programme and home-based care component was irregular.

monthly visits to patients' homes, where they provided a range of support and in most instances disseminated health information orally without the support of written materials to these patients. At the time of our study (2016–2017), this pilot project had been concluded, but CBO/FBO volunteers continued with home visits to patients enrolled in their programmes. Table 1 presents the key features of each of these CHBC programmes.

### 2.3 | Participants, sampling and recruitment

We targeted newly enrolled patients into CHBC programmes since no other intervention was administered, apart from the home-care patients received from these CBO/FBOs. Hypothetically, we wanted to establish if exposure or receipt of CHBC made any difference over time in how patients managed their conditions. Furthermore, baseline survey enrolment was restricted to CBO/FBOs that were actively delivering home-based care, ultimately only engaging four of the aforementioned CBO/FBOs (see Table 1).

Survey inclusion criteria were patients aged 18 years or older, with one or more diagnosed chronic conditions (HIV and NCDs), and newly registered in one of the CHBC programmes. We excluded patients in critical conditions and patients living outside the geographic locations covered by the CBO/FBOs. Patients' conditions were verified from patient-held medical records.

The survey sample size ( $n = 140$ ) was based on the ability to detect a 12-month pairwise comparison of mean change of at least 0.5 ( $SD 2.4$ ) in self-efficacy scores (Lorig et al., 2001) and a significance level of 5% at 95% power, after accounting for 30% attrition. Patients meeting the eligibility criteria were identified from CBO/FBO registers, with recruitment happening concurrently. CBO/FBO volunteers visited eligible patients to book appointments and the research team provided detailed study information and obtained consent prior to administering the survey.

### 2.4 | Study instrument and data collection procedures

#### 2.4.1 | Survey instrument development

Existing instruments for measuring patient self-management outcomes, and those validated for use in sSA settings and particularly in Malawi, are limited in scope and tend to be condition-specific (Harding et al., 2010; Robberstad & Olsen, 2010; Udedi, Muula, Stewart, & Pence, 2019). Given the paucity of tools that comprehensively examine various self-management outcomes among patients with diverse chronic conditions in sSA, and confirmed by findings from our earlier review (Aantjes, Ramerman, & Bunders, 2014), we adapted measures used to evaluate the Chronic

Disease Self-Management Programme (Lorig & Laurent, 2007; Self Management Resource Centre). Programme developers from Stanford University established generic scales evaluating outcomes of CDSMP interventions in different patient populations, which have been validated and widely used in different settings (Griffiths et al., 2005; Kennedy et al., 2007; Swerissen et al., 2006; Yukawa et al., 2010). However, there is limited to no published evidence of using these scales in sSA and for patients receiving non-CDSMP type self-management support interventions. The CDSMP scales were validated and adapted for use in the study population through the following steps: review of the scales by three research experts with experience working with chronically ill patients in sSA for construct relevance; translation and pretesting of scales among a small patient population ( $n = 20$ ); and modification and final adaptation of scales for use in the main survey.

## 2.4.2 | Self-management outcome measures

Self-management outcomes were measured using selected CDSMP scales adapted for use in the local population (Lorig & Laurent, 2007) and used the categorisation of outcomes as defined by Foster et al's systematic review (Foster et al., 2007). These were self-efficacy and health status. The latter included perceived illness intrusiveness, patient symptom rating, self-rated general health and quality of life—see File S1. Perceived illness intrusiveness was measured on a four-point scale which had nine items with a Cronbach's alpha coefficient of 0.88–0.94. The tool assessed the impact of disease and treatment on multiple aspects of a patient's daily life (i.e. physical well-being, diet, work, finances, family, social relations, recreation and spiritual life). Higher scores indicated greater limitation to activity/social roles.

Individual item scales were used to evaluate severity of patient symptoms (i.e. pain, fatigue, emotional distress/stress, shortness of breath and sleeping problems). Each was measured using a 10-point visual numeric score (0='no symptom'; 10='severe symptom').

Self-rated general health was measured by a five-point scale (1 = 'excellent'; 5 = 'very poor'), with lower scores indicating better health. This scale has been used in other studies (Lorig et al., 2001; Yukawa et al., 2010) and found to be a good predictor for future health. Quality of life was measured by a 10-point scale (0='very poor quality'; 10='excellent quality'), with higher scores indicating better quality of life.

Self-efficacy was measured using a 6-item scale and each scored using a 10-point visual numeric scale (1='not confident at all'; 10='totally confident'). Higher scores indicated participants had more confidence in managing their life with chronic conditions. The scale covered domains such as symptom control, health-modifying behaviour and tasks performed to minimise the need for medical attention. The Cronbach's alpha coefficient was 0.82–0.95.

In previous publications linked to this study (Angwenyi et al., 2018, 2019), we reported health behaviour outcomes (diet

and lifestyle, medication, care-seeking experiences) in this patient population that were considered essential in self-management. We reported on the nature and perceptions of self-management support patients received from various care providers (e.g. healthcare professionals, family caregivers, patient support groups and CBO/FBO volunteers).

## 2.4.3 | Data collection

Data were collected between April 2016 and May 2017. The tool was first pretested among a small patient population ( $n = 20$ ), purposively selected from CBO/FBO registers to allow for diversity in patient conditions and site of recruitment. This process provided an opportunity to check the accuracy of translations from adapted scales and to check the usability and comprehension of questions by respondents, including the use of visual numeric score cards to select responses. The final translated version was adapted for use, and the same set of questions was administered at baseline (T1) and after months 3 (T2), 6 (T3) and 12 (T4). Trained local-based research assistants (one male and two females) administered the survey instrument using the Open Data Kit system and verified forms uploaded to a secure web-based database.

## 2.5 | Ethical considerations

Ethical approval for this study was obtained from the Vrije Universiteit Amsterdam-Netherlands (EMGO<sup>+</sup>; WC2015-080, 27-Oct-2015), and the National Committee on Research in the Social Sciences and Humanities, Malawi (P.11/15/64, 10-Dec-2015). All participants provided written informed consent.

## 2.6 | Data analysis

The survey data set was downloaded from a web-based database in an Excel format. Data sorting and cleaning were carried out in Microsoft Excel<sup>®</sup>, and further analysis conducted in STATA (Version 13; StataCorp). Descriptive statistics including means, standard deviations and percentages were used to report patient characteristics and self-management outcomes. Pearson product-moment correlation was used to evaluate the strength and direction of the relationship between self-efficacy and health status outcome variables. To compare changes in outcomes (i.e. health status and self-efficacy) across time points, and using baseline scores as reference, we performed either the paired student *t* test (when the data were normally distributed) or Wilcoxon signed-rank test (when the data had a non-normal distribution). Due to multiple comparisons, we used statistical significance levels at Bonferroni-corrected *p*-value thresholds ( $p < .0125$ ) adjusted by number of comparisons (four survey time points). All statistical tests were two-sided.

**TABLE 2** Patients demographic characteristics and health profile at baseline ( $n = 140$ )

Patient characteristics	N = 140
CBO/FBO patients were enrolled to	
FBO-A	61 (43.6)
CBO-B	28 (20)
CBO-C	27 (19.3)
CBO-D	24 (17.1)
Gender	
Females	102 (72.9)
Males	38 (27.1)
Age (years)	
Mean (SD)	42.01 (13.85)
Median (range)	39.5 (20–84)
Age (categorical)	
<30 years	26 (18.57)
30–30.9 years	44 (31.43)
40–49.9 years	30 (21.43)
50–59.9 years	20 (14.29)
60+	20 (14.29)
Education (categorical)	
No schooling	17 (12.1)
1–5 years primary school	74 (52.9)
6–8 years primary school	39 (27.9)
Secondary (in)complete	9 (6.4)
College/tertiary and above	1 (0.7)
Main occupation	
Farming	71 (50.7)
Casual labourer/trader	43 (30.7)
Unemployed (unable to work)	13 (9.3)
Other (e.g. domestic worker)	10 (7.1)
Public/private sector worker	3 (2.1)
Marital status	
Currently married	88 (62.86)
Single/never married	8 (5.71)
Divorced/separated	23 (16.42)
Widowed	21 (15.0)
Patient conditions $n$ (%)	
HIV (all)	102 (72.9)
1) HIV only	85 (83.3)
2) HIV with co-morbidities	17 (16.7)
Hypertension	32 (22.9)
Epilepsy & other mental health conditions	10 (7.1)
Asthma	7 (5)
Stroke	4 (2.9)
Cancer	3 (2.1)

(Continues)

**TABLE 2** (Continued)

Patient characteristics	N = 140
Diabetes	2 (1.4)
Heart condition (cardiomegaly)	1 (0.7)
Multimorbid status	
1 condition	120 (85.7)
2 conditions	15 (10.7)
3 conditions	5 (3.6)
Years lived with chronic condition i.e. first diagnosis	
Mean (SD)	6.7 (8.3)
Median (IQR)	4.2 (0.2–34.3)
Range	0.01–47.4
Years lived with chronic condition (categorical)	
Less than 5 years	77 (55)
5–9.9 years	44 (31.43)
10+ years	19 (13.57)

We performed multivariate linear regression to examine factors associated with self-efficacy (continuous-dependent variable) when controlled for potential confounders at individual survey time points. Variables of interest were demographic characteristics, condition-related factors and exposure to self-management support (e.g. patient support groups and CHBC home visits). Using a stepwise deletion method, variables with a  $p < .25$  in the univariate analysis were included in one multivariable model. To assess predictors for self-efficacy improvement (categorical dependent variable), we used variables in the first model that met the cut-off point ( $p < .25$ ) in the univariate analysis. The level of statistical significance was set at  $p < .05$ .

### 3 | RESULTS

#### 3.1 | Patients' characteristics

At baseline, 140 patients were enrolled and interviewed. Patients who dropped-out or were lost to follow-up in the survey were 12 at month 3/T2, 11 at month 6/T3 and 14 at month 12/T4. During the entire study period, seven patients died and two declined consent. The majority (43%) of enrolled patients were from FBO A (Table 2). Nearly three quarters of the respondents were female ( $n = 102$ ; 72.9%), and the mean age was 42 years ( $SD$  13.8). Literacy levels were generally low, where 65% of patients had no or little elementary education (below 5 years of schooling). Sixty-three percent of patients were married and farming (50.7%) was the main source of occupation. At the time of the baseline survey, the top three conditions were HIV (72.9%;  $n = 102$ ), hypertension (22.9%;  $n = 32$ ), and epilepsy and mental health (7.1%;  $n = 10$ ). Co-morbidities were reported among survey patients, where 14.3%

( $n = 20$ ) had two or more chronic conditions and among HIV patients, where 16.7% ( $n = 17$ ) had co-infections. The duration with a chronic condition since first diagnosis was on average 6.65 ( $SD$  8.3) years.

### 3.2 | CHBC programme activities and contribution to patient self-management

During home visits, CHBC volunteers generally assisted patients with domestic chores, and emotional and spiritual encouragement. They exchanged information on general health and well-being, counselled on the importance of treatment adherence, referred sick patients to health facilities for medical care and encouraged patients to join peer support groups. We explored whether there were similarities or differences in how the different CHBC programmes conducted home visits (Table 3). At baseline, the proportion of patients receiving one or more visits from a CHBC volunteer was 97.9%. However, the proportion of patients not receiving a home visit appeared to increase over time (i.e. 12.5% at month 3, 42.6% at month 6 and 37.3% at month 12). There were significant associations among the CBO/FBOs in the regularity and number of visits to patient homes. At 6 and 12 months into the programme, the proportion of patients reporting not receiving any home visit was higher in CBO-B and CBO-D, compared to FBO-A and CBO-C. The overall level of satisfaction with CBO/FBO activities varied overtime (i.e. 70% at baseline compared to 50% at T2, 57.5% at T3 and 69.8% at T4). We observed patients in FBO-A and CBO-C were more likely to report being satisfied with CHBC providers support, as compared to patients in CBO-B and CBO-D. These differences were significant at months 6 and 12.

### 3.3 | What is the nature of the relationship between self-efficacy and other self-management outcome variables?

At the time of the baseline survey, we found evidence of an inverse relationship between self-efficacy and patient symptom scores (i.e. self-efficacy decreased with an increase in fatigue ( $r = -0.396$ ,  $p < .000$ ), pain ( $r = -0.3$ ,  $p < .000$ ) and emotional distress/stress symptoms ( $r = -0.363$ ,  $p < .000$ ) as shown in Table 4. Similarly, illness intrusiveness negatively correlated with self-efficacy ( $r = -0.516$ ,  $p < .000$ ). Self-efficacy increased with an increment in quality of life ( $r = 0.457$ ,  $p < .000$ ) and was positively associated with improvement in general health status ( $r = -0.599$ ,  $p < .000$ ; score is reverse coded). Overall, the direction and strength of association between self-efficacy with other self-management variables were relatively similar across all other survey data points.

### 3.4 | An evaluation of patient self-management outcomes

At baseline, the illness intrusiveness mean score was 0.59 ( $SD$  0.86), which slightly decreased at T2 (0.496,  $p = .009$ ). Baseline fatigue mean was 3.94 ( $SD$  3.84), which slightly reduced at T2 (2.75,  $p = .007$ ), T3 (2.58,  $p = .003$ ) and T4 (2.6,  $p = .003$ ). A low stress mean of 3.29 ( $SD$  3.91) was reported at baseline, which further reduced at T2 (2.22,  $p < .000$ ) and T4 (2.09,  $p = .007$ ). Shortness of breath mean dropped at T4 (0.97,  $p = .008$ ), as compared to the baseline mean of 1.96 ( $SD$  3.47). Self-efficacy mean at baseline was 5.91 ( $SD$  2.6), although after 12 months, the mean score significantly reduced to 5.1 ( $SD$  2.16,  $p = .000$ ). There was weak evidence to support improvements in quality of life and general health status, or a decline in pain and sleep-related problems across survey time points, as shown in Table 5 (see also figures in File S2).

### 3.5 | Factors associated with patient's self-efficacy to manage chronic conditions

We found strong evidence to support significant associations between self-efficacy and a patient's disease group at T1–T3, as shown in File S3. That is, non-HIV patients' scores were lower compared to HIV patients ( $p < .000$ ). Similarly, having co-morbidities was associated with lower self-efficacy scores, as observed at T1, T3 and T4 ( $p < .01$ ). At all survey intervals, not being in a marital relationship had a significant negative association with self-efficacy ( $p < .01$ ). Receiving more home visits from CBO/FBOs was positively associated with improved self-efficacy ( $p < .003$ ); however, this was only observed after 6 months (T3) of enrolment in a CHBC programme. The CBO/FBO characteristics impacted self-efficacy (i.e. self-efficacy for patients enrolled in CBO-B (T1,  $p = .03$ ) and CBO-C (T3,  $p = .52$ ) were significantly lower when compared to the reference FBO-A). Occupation status was only significant at baseline, where being unemployed was negatively associated with self-efficacy ( $p = .001$ ).

### 3.6 | Factors associated with self-efficacy improvement

A multivariate logistics regression explored factors associated with self-efficacy improvement (a binary-dependent variable) over a 12-month period (Table 6). Three months after the baseline survey, there was a significant positive association of self-efficacy improvement for patients enrolled in CBO-B (OR 3.79; 95% CI 1.2–12.4). However, the odds for self-efficacy improvement were lower among patients with conditions longer than 10 years (OR 0.24; 95% CI 0.1–1.01), those not enrolled in a support group (OR 0.25; 95% CI 0.1–0.9) and those receiving over three home visits (OR 0.15; 95% CI 0.03–0.7). After 6 months in the CHBC programme, the odds for self-efficacy improvement increased for patients receiving over three home

**TABLE 3** Regularity of home visits and perceptions of CHBC support

	Baseline/T1					Month 3/T2			
	FBOA	CBOB	CBOC	CBOD	Total	FBOA	CBOB	CBOC	CBOD
<b>N (%)</b>	<b>61</b>	<b>28</b>	<b>27</b>	<b>24</b>	<b>140</b>	<b>56</b>	<b>25</b>	<b>25</b>	<b>22</b>
CBO home visits in < 30 days at time of survey <sup>a</sup>									
None (0)	0	0	2	1	3 (2.14)	6 (10.7)	2 (8)	4 (16)	4 (18.2)
1–2 visits	57 (93.4)	27 (96.4)	23 (85.2)	18 (75)	125 (89.3)	36 (64.3)	18 (72)	14 (56)	12 (54.5)
3/more visits	4 (6.6)	1 (3.6)	2 (7.4)	5 (20.8)	12 (8.57)	14 (24)	5 (20)	7 (28)	6 (27.3)
	$\chi^2 = 12.1; p = .05^a$					$\chi^2 = 2.53; p = .86$			
Overall satisfaction with CBO/FBO support									
Satisfied	39 (63.9)	21 (75)	22 (81.5)	17 (70.8)	99 (70.7)	32 (57.1)	9 (36)	14 (56)	9 (40.9)
Indifferent/ not satisfied	22 (36.1)	7 (25)	5 (18.5)	7 (29.2)	41 (29.3)	24 (42.9)	16 (64)	11 (44)	13 (59.1)
	$\chi^2 = 3.1; p = 3.382$					$\chi^2 = 4.2; p = .25$			

<sup>a</sup>At baseline visit (T1), no visits is explained by the short period between enrolment in CHBC and survey administration and computed based on patients self-report.

visits (OR 3.56; 95% CI 1.08–11.7). After 12 months, self-efficacy improvement was significantly associated with occupation status (being unemployed) and patient literacy levels (primary 6–8).

#### 4 | DISCUSSION

This study provides evidence on the benefits of self-management interventions delivered to a heterogeneous group of chronically ill patients living in rural Malawi, who received CHBC for 12 months. In exploring the inter-relation between self-management constructs, we found self-efficacy correlated with other health status outcomes. Self-efficacy appeared to increase upon a decrease in patient symptoms and illness intrusiveness, and when quality of life and general health status improved. There were marginal but significant changes in self-management outcomes, for example, a reduction in patient-reported symptoms (fatigue and emotional distress/stress) after month 3–12 (T2–T4) and illness intrusiveness after 3 months (T2). There was insufficient evidence to support improvements in general health status and quality of life observed after month 3–12 (T2–T4). We found mixed results in the self-efficacy outcome with a baseline mean of 5.91 (*SD* 2.6), which significantly reduced to 5.1 (*SD* 2.16,  $p = .000$ ) after the 12-month follow-up. While previous studies, mostly based on the CDSMP programme, have reported improvements in self-efficacy (Jerant, Moore, Lorig, & Franks, 2008; Lorig et al., 2001; Packer et al., 2012; Yukawa et al., 2010), the observed findings require a closer examination of the intervention studied and factors that could possibly explain these variations. The regression analysis performed provides supporting evidence of factors associated with self-efficacy changes and possible predictors for improvement as observed in our study setting.

Condition-related factors were significantly associated with a patient's self-efficacy. Self-efficacy for patients in the non-HIV patient group was lower as compared to patients in the HIV group

and lower for patients with multimorbidity as compared to patients with a single chronic condition. The latter finding corroborates with published evidence, where the complexities surrounding management of multiple conditions could impair a patient's capacity to perform self-management tasks and further decrease quality of life (Martin et al., 2013; Oni et al., 2014; Schulman-Green et al., 2016); for instance, managing different treatment therapies, dealing with symptoms and performing daily chores. Hence, multimorbid patients require extra support including materials, information and cognitive resources to enhance their self-efficacy. The differences in self-efficacy scores between HIV and non-HIV patients are illustrative of the ongoing disparities in health service provision for HIV and other chronic conditions in Malawi, as in most parts of sSA (Levitt, Steyn, Dave, & Bradshaw, 2011; Rabkin & El-Sadr, 2011). Our study found that important support structures like treatment buddies to improve treatment adherence (Luque-Fernandez et al., 2013), and peer support groups to exchange information, skills and strategies for handling complex tasks and challenging experiences were absent for non-HIV patients (Angwenyi et al., 2019; Russell et al., 2016). Addressing these inequities requires facilitating access and expanding existing initiatives to a mixed chronically ill patient population. Our results further suggest that, 3 months into the programme, the odds for self-efficacy improvement were lower for patients living with conditions for a longer duration of time. A plausible explanation is that the propensity of patients with a long-standing knowledge of their condition and newly exposed to CHBC and self-management support to alter habits/practices may prove to be more difficult, as compared to recently diagnosed patients who may be more keen and motivated to adopt new practices. Drawing on the health action process approach theory, which recognises that patients are at different stages of change, and by influencing perceived self-efficacy, care providers can help patients transition from goal setting to goal pursuit and adopt health-enhancing behaviour (Schwarzer, Lippke, & Luszczynska, 2011).



Total	Month 6/T3				Total	Month 12/T4				Total
	FBOA	CBOB	CBOC	CBOD		FBOA	CBOB	CBOC	CBOD	
128	57	25	25	22	129	55	24	25	22	126
16 (12.5)	20 (35.1)	19 (76)	6 (24)	10 (45.5)	55 (42.6)	14 (25.5)	16 (66.7)	8 (32)	9 (40.9)	47 (37.3)
80 (62.5)	26 (45.6)	5 (20)	10 (40)	10 (45.5)	51 (39.5)	27 (49.1)	6 (25)	13 (52)	11 (50)	57 (45.3)
32 (25)	11 (19.3)	1 (4)	9 (36)	2 (9.1)	23 (17.8)	14 (25.5)	2 (8.3)	4 (16)	2 (9.1)	22 (17.5)
	$X^2 = 20.8; p = .003^a$					$X^2 = 14.7; p = .03^a$				
64 (50)	38 (67.9)	8 (32)	17 (68)	10 (47.6)	73 (57.5)	43 (78.2)	11 (45.8)	21 (84)	13 (59.1)	88 (69.8)
64 (50)	18 (32.1)	17 (68)	8 (32)	11 (52.4)	54 (42.5)	12 (21.8)	13 (54.2)	4 (16)	9 (40.9)	38 (30.2)
	$X^2 = 11.1; p = .01^a$					$X^2 = 11.97; p = .008^a$				

The findings also highlight the need to further examine the possible differential impact of the four CHBC programmes on self-management outcomes of their respective patient populations. For example, the general decline in patient home visits observed after 6 and 12 months was highest in CBO-B and CBO-D, as compared to FBO-A and CBO-C. The regularity of CHBC contact could possibly have influenced how patients regarded the CHBC providers' support. That is, patients in FBO-A and CBO-C were more satisfied with CHBC support and nearly 70% of these patients received monthly home visits. Similar patterns were observed in self-efficacy scores per CHBC programme; self-efficacy of patients served by FBO-A was higher compared to patients from CBO-B and CBO-C. We found associations between the regularity of CHBC visits and patients' self-efficacy, whereby receiving three or more home visits from CHBC providers was positively associated with improved self-efficacy and the likelihood for improvement was higher after 6 months of enrolment. The latter finding suggests the presence of a time-bound relationship between CHBC activities and its effect on self-efficacy. That is, regular receipt of CHBC for relatively longer periods contributes to self-efficacy improvement compared to CHBC at 3 months or at enrolment, where no significant improvements were observed.

Several reasons could explain the variations witnessed among the four CHBC programmes. First, the regularity of patient home visits was largely dependent on CHBC volunteers dedicating time for home visits and how they were supported in this role. Programmes primarily operate on a voluntary basis, with no funding base to support volunteer's transport costs and compensation for time spent, as was the case during the pilot project. While our analysis did not extend to factors influencing CHBC volunteers' performance, evidence elsewhere suggests that the lack of incentives and unsustainable funding to volunteer-operated programmes pose a threat to programme durability and capacity to provide chronic care support (Schneider & Lehmann, 2016;

Wouters et al., 2012; Wringe et al., 2010). The motivation to continue volunteering despite these challenges is believed to be intrinsically driven by altruism and/or desires to maintain relationships formed with patients, and observance of sociocultural norms, whereby caring for the sick is considered noble (Busza, Dauya, Makamba, & Ferrand, 2018; Pindani, Maluwa, Nkondo, Nyasulu, & Chilemba, 2013). Second, due to the limited training that volunteers receive, their capacity to serve patients more substantially (beyond psychosocial support and domestic chores) is compromised. For more optimal self-management support, volunteers in our study setting would require additional training and knowledge on prevalent chronic conditions, given the rise in multimorbid patients, and enhancement of counselling and problem-solving skills, supported with simplified educational manuals to enable them to adequately support a heterogeneous group of patients and their family caregivers. Regular supportive supervision from healthcare professionals based in facilities in CHBC catchment areas could strengthen the continuity of care and patient referral, especially for patients in need of close monitoring. Third, the proximal location of CHBC programmes to and their linkages with other health service actors is likely to have had an influence on patient access to additional care resources necessary for self-management. For instance, patients served by FBO-A, located within the district catchment area, had better access to a variety of healthcare services (both general and specialised care) to meet medical needs, while those served by CBO-B and CBO-C reported access challenges due to poor road connectivity and limited service options, consisting of overstretched primary care facilities.

Beyond condition-related and CHBC programme features, we also observed socio-demographic characteristics that appeared to influence patients' perceived self-efficacy. Self-efficacy scores for patients in marital union were better than for those who were not. People with chronic conditions relied on primary caregivers, such as spouses and other family members, in managing

**TABLE 4** Correlation scores between self-efficacy and other self-management variables

		Self-efficacy	Fatigue symptom	Pain symptom	Shortness of breath	Sleeping problem	Stress symptom	Illness intrusiveness	Quality of life	General health
Self-efficacy	T1	1								
	T2	1								
	T3	1								
	T4	1								
Fatigue symptom	T1	-0.396**	1							
	T2	-0.307**	1							
	T3	-0.498**	1							
	T4	-0.349**	1							
Pain symptom	T1	-0.3*	0.589**	1						
	T2	-0.314*	0.578**	1						
	T3	-0.465**	0.656**	1						
	T4	-0.318*	0.578**	1						
Shortness of breath	T1	-0.351**	0.355**	0.373**	1					
	T2	-0.266 <sup>+</sup>	0.377**	0.449**	1					
	T3	-0.46**	0.517**	0.477**	1					
	T4	-0.191*	0.488**	0.407**	1					
Sleeping problem	T1	-0.351**	0.403**	0.375**	0.453**	1				
	T2	-0.201 <sup>+</sup>	0.559**	0.472**	0.562**	1				
	T3	-0.433**	0.532**	0.563**	0.553**	1				
	T4	-0.172 <sup>+</sup>	0.384**	0.437**	0.54**	1				
Stress symptom	T1	-0.363**	0.424**	0.336**	0.396**	0.532**	1			
	T2	-0.333**	0.539**	0.439**	0.414**	0.438**	1			
	T3	-0.473**	0.625**	0.526**	0.498**	0.586**	1			
	T4	-0.211 <sup>+</sup>	0.368**	0.347**	0.478**	0.582**	1			
Illness intrusiveness	T1	-0.516**	0.477**	0.443**	0.397**	0.41**	0.452**	1		
	T2	-0.388**	0.591**	0.503**	0.423**	0.502**	0.483**	1		
	T3	-0.468**	0.618**	0.694**	0.445**	0.593**	0.539**	1		
	T4	-0.518**	0.575**	0.551**	0.459**	0.5**	0.539**	1		
Quality of life	T1	0.455**	-0.615**	-0.467**	-0.284*	-0.425**	-0.486**	-0.621**	1	
	T2	0.332**	-0.76**	-0.594	-0.385**	-0.582**	-0.671**	-0.589**	1	
	T3	0.615**	-0.699*	-0.642**	-0.477**	-0.583**	-0.57**	-0.653**	1	
	T4	0.403**	-0.572**	-0.584**	-0.41**	-0.514**	-0.489**	-0.668**	1	
General health	T1	-0.599**	0.461**	0.296*	0.278*	0.279*	0.348**	0.463**	-0.499*	1
	T2	-0.53**	0.395**	0.342*	0.219 <sup>+</sup>	0.252 <sup>+</sup>	0.4**	0.528**	-0.507**	1
	T3	-0.588*	0.508**	0.433**	0.379**	0.435**	0.399**	0.604**	-0.683**	1
	T4	-0.516**	0.484**	0.371**	0.305**	0.328*	0.317*	0.594**	-0.631**	1

Notes: General health status score is reverse coded.

<sup>+</sup> $p < .05$ ;

\* $p = /<0.001$ ;

\*\* $p = /<0.0001$ .

their condition. These caregivers played an instrumental role in the provision of emotional support, financial assistance and health as well as non-health-related tasks, which helped facilitate a continuation of social/role functions and in coping with stressors (Mthembu, Brown, Cupido, Razack, & Wassung, 2016;

Schulman-Green et al., 2016). In African settings with a high disease burden, and where family caregivers shoulder the heaviest care-giving burden, being separated/widowed/divorced is associated with difficulties in coping due to condition-related stigma and livelihood challenges (Jankey & Modie-Moroka, 2011;

TABLE 5 Changes in patient self-management outcomes compared with baseline scores

Outcomes	Items	Range	Score	Baseline T1 (n = 140)	Month 3 T2 (n = 128)	p-value (T1-T2)	Month 6 T3 (n = 129)	p-value (T1-T3)	Month 12 T4 (n = 126)	p-value (T1-T4)
Illness intrusiveness**	9	0-4	Mean (SD)	0.59 (0.86)	0.496 (0.91)	.009*	0.64 (0.96)	.344	0.47 (0.85)	.026
			Median (IQR)	0.11 (0-0.88)	0 (0-0.44)		0 (0-1)		0 (0-0.44)	
Fatigue VNS**	1	0-10	Mean (SD)	3.94 (3.84)	2.75 (3.33)	.007*	2.58 (3.2)	.003*	2.6 (3.35)	.003*
			Median (IQR)	3 (0-8)	1 (0-5)		1 (0-5)		0 (0-5)	
Pain VNS**	1	0-10	Mean (SD)	3.54 (3.67)	3.14 (3.45)	.261	3.05 (3.71)	.127	2.6 (3.28)	.013
			Median (IQR)	2 (0-7)	2 (0-6)		0 (0-7)		0 (0-5)	
Stress VNS**	1	0-10	Mean (SD)	3.29 (3.91)	2.2 (3.24)	.000*	2.43 (3.46)	.014	2.09 (3.4)	.007*
			Median (IQR)	0.5 (0-8)	0 (0-5)		0 (0-5)		0 (0-3)	
Shortness of breath VNS**	1	0-10	Mean (SD)	1.96 (3.47)	1.02 (2.22)	.016	1.32 (2.53)	.047	0.97 (2.46)	.008*
			Median (IQR)	0 (0-2.5)	0 (0-0.5)		0 (0-2)		0 (0-0)	
Sleeping problem VNS**	1	0-10	Mean (SD)	2.22 (3.36)	1.48 (2.74)	.087	1.64 (2.97)	.14	1.96 (3.31)	.581
			Median (IQR)	0 (0-4.5)	0 (0-1)		0 (0-2)		0 (0-3)	
Self-reported general health status**	1	1-5	Mean (SD)	2.91 (1.1)	2.78 (0.96)	.28	2.84 (1.26)	.875	2.65 (1.12)	.12
			Median (IQR)	3 (2-4)	3 (2-3)		3 (2-4)		3 (2-3)	
Self-reported quality of life VNS++	1	0-10	Mean (SD)	6.69 (3.32)	7.07 (2.88)	.297	7.12 (3.07)	.3	7.21 (3.01)	.16
			Median (IQR)	7 (5-10)	8 (5-10)		8 (5-10)		8 (5-10)	
Self-efficacy VNS++	6	1-10	Mean (SD)	5.91 (2.61)	6.05 (2.66)	.602	5.59 (2.88)	.28	5.1 (2.16)	.000*
			Median (IQR)	6 (3.92-8.25)	6.33 (4.5-8.33)		5.17 (3.3-8.83)		5.167 (3.67-6.83)	

Abbreviations: SD, standard deviation; VNS, visual-numeric scale. Wilcoxon signed-rank test performed due to asymmetrical distribution.

\*\*Higher score is better;

\*Lower score is better.

\*Significance level at Bonferroni-adjusted p-value (p < .0125)

**TABLE 6** Multivariate logistics regression of factors associated with self-efficacy improvement across survey time points

Factors associated with self-efficacy improvement (OR = 1)	Self-efficacy change (after 3 months)			Self-efficacy change (after 6 months)			Self-efficacy change (after 12 months)		
	OR	p-value	95% CI	OR	p-value	95% CI	OR	p-value	95% CI
<b>Disease group</b>									
HIV (Ref)									
Non-HIV	0.969	.956	0.32–2.92	0.581	.28	0.22–1.55	2.816	.086	0.86–9.17
<b>No. of chronic conditions</b>									
1 (Ref)									
2/more	4.116	.061	0.94–18.1	1.255	.693	0.41–3.89	3.563	.073	0.89–14.2
<b>Years lived with condition</b>									
<5 years (Ref)									
5–9.9	0.82	.684	0.32–2.13	1.031	.95	0.4–2.63	0.819	.721	0.27–2.45
10 + years	0.24	.051*	0.05–1.01	0.948	.93	0.29–3.12	1.416	.602	0.38–5.24
<b>Gender</b>									
Female (Ref)									
Male	0.808	.678	0.29–2.21	0.969	.945	0.39–2.39	0.453	.18	0.14–1.44
<b>Current marital status</b>									
Married (Ref)									
Not married	0.73	.498	0.29–1.81	0.982	.965	0.43–2.23	1.748	.235	0.7–4.39
<b>Highest education</b>									
No schooling (Ref)									
Primary 1–5	2.2	.256	0.56–8.61	0.749	.661	0.21–2.73	5.189	.065	0.9–29.88
Primary 6–8	0.958	.955	0.22–4.25	0.535	.39	0.13–2.23	6.922	.048*	1.02–46.9
Secondary and above	5.932	.113	0.65–53.57	0.393	.359	0.05–2.89	0.935	.967	0.04–23.7
<b>Main occupation</b>									
Farming (Ref)									
n/formal sector	0.811	.769	0.2–3.3	0.716	.583	0.22–2.36	0.823	.807	0.17–3.91
Unemployed	1.531	.705	0.2,13.9	1.483	.622	0.31–7.11	16.126	.031*	1.02–46.9
<b>CBO/FBO site</b>									
FBO-A (Ref)									
CBO-B	3.791	.028*	1.15–12.4	1.609	.41	0.52–4.99	1.412	.594	0.39–5.03
CBO-C	0.512	.286	0.15–1.75	0.595	.368	0.19–1.84	0.592	.429	0.16–2.17
CBO-D	1.531	.514	0.42–5.49	1.544	.458	0.49–4.86	1.225	.767	0.32–4.72
<b>CBO/FBO home visits</b>									
None (Ref)									
1–2 visits	0.42	.228	0.1–1.72	2.056	.112	0.85–4.99	1.105	.85	0.39–3.1
3/more visits	0.148	.017*	0.03–0.71	3.556	.036*	1.08–11.7	0.663	.569	0.16–2.73
<b>Member patient support group</b>									
Yes (Ref)									
No	0.245	.035*	0.06–0.9	1.477	.427	0.56–3.87	0.619	.413	0.2–1.95
Adjusted (_cons)	5.406	.165	0.49–58.65	0.596	.526	0.12–2.95	0.075	.023*	0.01–0.7

\*Statistical significance level ( $p < .05$ ).

Mthembu et al., 2016). Our data further suggest that patient literacy is an important factor in self-management outcomes; hence, there is a need to customise health education messages to suit

semi-literate patient populations. Being economically disadvantaged or unemployed puts further pressure on patients' self-management efforts. Self-management support interventions in such

contexts thus require a holistic focus on patient needs and should include offering livelihood support.

#### 4.1 | Implications for clinical practice and self-management support interventions

The future role of CHBC programmes in chronic care warrants further discussion. The emphasis on the importance of community-based support in current conceptualisations of chronic care (Wagner, Austin, & Von Korff, 1996; World Health Organization, 2002) reaffirms the need to include such programmes in self-management support strategies. The unique position of CHBC is their prime focus on delivering interventions within the family context, hence providing opportunities for engaging patients and family caregivers more closely in chronic care. Furthermore, most parts in sSA continue to experience severe health workforce challenges, and as part of task-shifting strategies, CHBC programmes have and will continue to play a prominent role. For instance, the active home tracing of patients lost to care, active identification and recruitment of patients in need of care, and provision of psychosocial and palliative care support are all essential activities along the continuum of care for chronically ill patients. However, despite the recognition of this role, the sustainable funding and full integration of CHBC programme interventions in government-led health strategies continue to face critical challenges towards their fulfilment.

Finally, a potential utility of the self-efficacy measure is to incorporate it as a screening instrument in clinic settings (Peters, Potter, Kelly, & Fitzpatrick, 2019). If well adapted for practical use within settings such as ours, it could support healthcare professionals in identifying patients with lower self-efficacy, and in prompting referrals to self-management resources appropriate for their needs.

#### 4.2 | Methodological considerations and study limitations

A strength in our study design was the inclusion of multiple chronic conditions and assessment of self-management outcomes using tools adapted for this context and at multiple time points, for relatively longer periods. However, several limitations inherent in our design may limit the generalisability of findings. These include conducting our research in one rural district and the relatively small sample size of chronically ill patients. The absence of a comparison group and the use of a one-group pre- and post-test design (Wludyka, 2011) only allowed for an exploratory analysis, thereby limiting our capacity to draw causal inferences and rendering our analysis prone to misspecifications in the relationship between variables. Given this limitation, some outcome variables (e.g. self-efficacy) were analysed at single time points to explore relationships more closely. Other analytical approaches such as multilevel modelling (mixed effect models) would be better suited for multiple comparisons and estimating effect sizes across time,

but did not fit our data well. That is, the highly imbalanced sample sizes across the patient groups studied and the possibility of incorrectly parameterising the random effects, which could yield unreliable model estimates, posed a challenge (Harrison et al., 2018). The selected CHBC programmes were in the post-intervention phase of a pilot project and perhaps the findings could have been different had the evaluation taken place during the active phase of the project. Nonetheless, the present study raises salient issues for consideration on the role and sustainability of CHBC programmes in chronic care support, while accounting for how programme heterogeneity may have influenced results. Another limitation in our analysis is the exclusive focus on the volunteers and their interaction with patients, and not on the role of family caregivers. Finally, although the adapted CDSMP scales used in our study demonstrated reasonable internal consistency, further validation of scales is necessary prior to use in other chronically ill patient populations in similar sSA settings. Additionally, considering the inclusion of other measurements such as mental health assessments would be important, given the influence of chronic conditions on psychological well-being and on patients' self-management capacity.

## 5 | CONCLUSION

In resource-limited settings like rural Malawi, CHBC programmes play an instrumental role in offering care and support to patients with chronic conditions. Our findings demonstrate that prolonged exposure to CHBC interventions positively impacts patient self-management outcomes, including self-efficacy. Moving forward, more robust responses will be needed to secure the position of CHBC programmes in enhancing patient self-management in challenging healthcare settings and to further expand their competency in serving a heterogeneous multimorbid patient population.

#### ACKNOWLEDGEMENTS

We are grateful to the study participants for their involvement in this research. We thank Dadirai Khambadza, Joseph Chomanika and Vanessa Kumwenda for data collection support. We wish to thank Dr. Symon Kariuki, Dr. Seth Inzaule, Assoc. Prof. Frank Van Leth, Dr. Ruth Peters, Prof. Charles Agyemang, Jeroen de Man and Tom Smekens for their various contribution in the study conceptualisation, design, statistical analysis and commenting on manuscript drafts. We appreciate support from Phalombe District Health Office, the Archdiocese of Blantyre Catholic Health Commission and the community/faith-based organisations in implementing this study.

#### CONFLICT OF INTEREST

The authors declare they have no competing interests.

#### AUTHORS' CONTRIBUTIONS

VA and CA conceptualised the study. VA conducted the investigations and analysed the data under supervision of CA. VA wrote the

first draft, with CA providing critical feedback to the manuscript structure. JB-A, BC and JVL reviewed the full draft and suggested important revisions to the paper. All authors read and approved the final manuscript.

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**How to cite this article:** Angwenyi V, Bunders-Aelen J, Criel B, Lazarus JV, Aantjes C. An evaluation of self-management outcomes among chronic care patients in community home-based care programmes in rural Malawi: A 12-month follow-up study. *Health Soc Care Community*. 2021;29:353–368. <https://doi.org/10.1111/hsc.13094>

## SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.