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Hypertension and diabetes control: faith-based centres offer a promise for expanding screening services and linkage to care in Ghana

Engelbert A. Nonterah[1,2,3*], Samuel T. Chatio[1,2], Andy Willis[4], Joseph A. Alale[1], Sawudatu Zakariah-Akoto[5], Natalie Darko[6], Ffion Curtis[7], Setor K. Kunutsor[8], Ceri Jones[9], Samuel Seidu[6,7] and Patrick O. Ansah[1,2]

Abstract

Background Hypertension and type 2 diabetes mellitus (T2DM) are important contributors to noncommunicable disease related morbidity and mortality. Health systems could benefit from exploring the use of Faith-Based Centres (FBC) to screen and link suspected cases for further care in order to help achieve Sustainable Development Goal (SDG) 3. The study investigated the role of faith-based screening for T2DM and hypertension and the linkage of cases to the healthcare system and examined the care cascade in the Kassena Nankana Districts of Northern Ghana.

Methods We screened individuals from 6 FBCs for elevated blood pressure and hyperglycaemia. Suspected hypertension and T2DM cases were referred to health facilities for confirmation and subsequently followed them up for 3 months. We assessed the prevalence of behavioural and metabolic risk factors, including hypertension and T2DM, and the retention of referred cases in the healthcare system over follow up period. We further assessed levels of awareness, treatment and adequate control of hypertension and T2DM.

Results A total of 631 participants were screened, (mean age 49 ± 16years, 73% female) from 6 Faith based Centres. More males than females reported smoking tobacco (14.5% vs. 0.7%) and been physically active (64.5% vs. 52.7%) while more females were obese (29.6 kg/m^2 vs. 14.5 kg/m^2) and had a higher mean waist circumference (89.0 cm IQR 75-116 cm vs. 84.2 cm IQR 72–107 cm), hip circumference (101.5 ± 10.6 cm vs. 96.4 ± 8.6 cm) and waist-to-hip ratio (0.86 ± 0.1 cm vs. 0.87 ± 0.1 cm) than males. The prevalence of confirmed hypertension and T2DM was 27.9% and 3.5% respectively with no observed sex differences. We observed deficits in the hypertension and T2DM care cascade with reported low awareness, treatment and uncontrolled levels. A 3-month follow up showed a retention in care of 100% in month one and 94.9% in the third month. There was an increase in treatment (39.4% in month-1 and 82.8% in month-3) and control (26.3% in month-1 and 76.3% in month-3) of hypertension and T2DM combined.

Conclusion Faith-based centres have the potential to enhance the screening, linkage to the healthcare system, and management of hypertension and T2DM. This improvement over the routine system could lead to earlier diagnoses,

*Correspondence:
Engelbert A. Nonterah
drenanonterah@gmail.com

Full list of author information is available at the end of the article

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a reduction in complications, and decreased premature mortality from cardiovascular diseases. Consequently, these efforts would contribute significantly to achieving SDG 3.

Keywords Faith-based centres, Hypertension, Diabetes, Primary prevention, Health Promotion

Introduction

Hypertension and type 2 diabetes mellitus (T2DM) are significant contributors to noncommunicable diseases (particularly cardiovascular diseases, CVDs) related morbidity and mortality. Globally and in 2022, 1.3 billion and 460 million people were affected with hypertension and T2DM 1 https://www.who.int/news-room/fact-sheets/detail/hypertension, https://www.who.int/news-room/fact-sheets/detail/diabetes. About 80% of these cases occur in low- and middle-income countries (LMIC) such as Ghana. The prevalence of hypertension in Ghana ranges between 19 and 35% https://www.who.int/publications/m/item/hypertension-gha-2023-country-profile [1–3] and that of diabetes is reported to be 3–8% [5]. In the Navrongo Health and Demographic Surveillance Site (HDSS) and among middle aged adults, hypertension prevalence increased from 19% in 2009 to 25% in 2015 [4, 5]. T2DM in the same middle-aged adult population was found to be 1.5% in 2015 [6].

Despite the rising burden, there is huge deficit in care for chronic noncommunicable diseases. Globally the proportion of undiagnosed hypertension is about 50% with more men (62%) than women (40%) likely to be undiagnosed [1, 2]. There is further evidence that a between 40 and 60% of people with hypertension and diabetes are not aware of their status, with about 55–72% having limited access to treatment and when on treatment only 19–24% achieve adequate control [2–4, 6]. In Ghana, care related to CVDs is primarily overseen by secondary care level facilities with little participation from the primary healthcare system. Primary prevention through health promotion and expanded access to screening is a low cost and accessible measure in the management and control of hypertension and T2DM. Currently the World Health Organization's Package of Essential Noncommunicable Disease Interventions (WHO PEN) Plus initiative, an integrated care delivery strategy aiming to alleviate noncommunicable diseases among the world's poorest children and young adults is at different stages of implementation by African countries https://www.ncdi-poverty.org/who-afro-pen-plus-strategy, https://www.afro.who.int/publications/who-pen-and-integrated-out-patient-care-severe-chronic-ncds-first-referral-hospitals. In Ghana, there are initiatives by the Ghana Health Service (GHS) to expand screening and referral from the primary to higher levels of healthcare. The Ghana Health Services (GHS) introduced wellness clinics to expand access to screening for NCDs especially hypertension and T2DM. Recently and together with the Ministry of Health (MOH), the GHS is implementing the Network of Practice (NoP) policy, which seeks to strengthen health centres as intermediate referral points https://ghs.gov.gh/2024/02/10/ghana-health-service-unveils-implementation-guidelines-for-networks-of-practice-at-the-2024-senior-managers-meeting-smm-prime/. The NoP programme seeks to expand screening service and improved referral pathways from community-based health and planning services (CHPS) compounds, market clinics and community pharmacies are mandate to refer cases to the health centres for further management [7].

These available opportunities for screening within the health service could benefit from exploring other non-health system-based approaches such as using faith-placed and faith-based centres. This is particularly important since religion and faith are a crucial part of human life and influence physical health in diverse ways – disease prevention, health-seeking, adherence to medication, recovery and coping strategies [8]. In Ghana, estimates from the 2020 population and housing census indicate that 98.9% of the population belong to a faith organization, with only 1.1% identifying as not belonging to any religion or faith [9]. The scope of religious affiliation has increased significantly since the 2016 Population and Housing Census with a gradual shrinkage in the number of people who do not belong to any faith or religious organization [9] over the stated period. Faith-placed and faith-based interventions therefore remain a viable option to serve as avenue for health promotion activities, expanding screening services and serving as referral points. Despite the evidence of this potential beneficial effect from other settings of this potential beneficial effect, this is yet to be explored in Ghana.

Our formative qualitative work identified the willingness of FBC, and congregation members to participate in medical screening for T2DM and hypertension, and referral to secondary care [10]. We set out to validate the hypothesis that that FBC could be a used for screening and linking persons with suspected hypertension and T2DM to the health system for care. This work was particularly timely due to the introduction of the NoP as well as hypertension as a tracer indicator for improved CVD services in the primary healthcare level. This paper reports findings of hypertension and T2DM medical screening exercise executed in 6 FBCs in the Kassena Nankana Districts of Northern Ghana.

Methodology

This study was part of a broader study in which we aimed to we aim to pilot the feasibility of screening for hypertension and T2DM in faith centres for prompt referral to the health system within the Kassena-Nankana Districts of Northern Ghana [10]. The initial phase of the study included a mapping exercise to identify community assets that will facilitate the implementation of a faith-based model of education, screening and referral, and the second phase aimed at assessing acceptability of the intervention among faith leaders and congregation member. The third phase was the actual medical screening exercise, results of which are presented in this paper.

Study design, setting and participants recruitment

We conducted a cross sectional study between June and July, 2023 where individuals 18+years underwent voluntary medical screening. A nested longitudinal study of individuals confirmed with hypertension and T2DM were then followed up monthly for three months. The study was conducted in the Kasena-Nankana East Municipality and Kasena-Nankana West District in the Upper East Region of Northern Ghana. The two districts fall within the coverage area of the Navrongo Health and Demographic Surveillance System (HDSS) operated by the Navrongo Health Research centre (NHRC) [11].

Selection of churches During the asset mapping phase, the type, number of membership strength and location of FBCs were documented. We therefore sampled each FBC to ensure adequate representation of the various faith groups. Within the FBC, we further selected those with a large congregation to enable us have a wider reach of individuals. We further ensured geographical distribution of the selected FBCs so as to cover the two districts (3 FBC were selected from the Kassena Nankana Municipality and 3 from the Kassena Nankana West District). The main inclusion criterion for the medical screening was any individual 18+years who was willing to have their blood pressure and glucose measured. There was no sampling as this was purely a voluntary exercise opened to members of the various FBCs.

Data collections and physical measurements

Potential participants were identified following announcements by the Faith leaders in the various churches and mosques within the study communities. Written signed, or thump printed informed consent was obtained prior to study procedures. A semi-structured questionnaire was administered prior to the measurement of blood pressure and blood glucose. The questionnaire included demographic information; self-reported lifestyle risk factors of cardiovascular disease and metabolic risk measures such as blood pressure and glucose (Supplementary material S1). The WHO Steps questionnaire https://www.who.int/teams/noncommunicable-diseases/surveillance/systems-tools/steps/instrument was used to obtain information on lifestyle risk factors – smoking and alcohol use in the past 12 months, fruit & vegetable servings in a day and physical activity measured as moderate-to-vigorous physical activity of 150 min per week. We also assessed frequency of using salt and salty sauce or seasoning and processed foods. Weight was measured to the nearest 0.1 kg using a calibrated weighing scale (Seca GmbH & Co. Hamburg, Germany) in line with standard manufacturers operating procedures. Standing height was measured to the nearest centimetre (cm) using a hand-held Stadiometer (Stature meter, 2 M), Crymych, Wale). Waist circumference (WC) was measured using a stretch-resistant tape measure (SECA, Hamburg, Germany. Participants, in light clothing and standing up straight with arms abducted, the tape was placed horizontally around the narrowest part of the torso, about halfway between the iliac crest and the lowest rib. WC measurements were taken at the end of normal expiration to the nearest centimetre (cm). Hip circumference (HC) was measured to the nearest cm using the same non-stretch tape measure and with the tape placed around the most protruding part of the buttocks, ensuring that the zero mark was to the participant's side. Blood pressure was measured using a digital sphygmomanometer (Omron M6, Omron, Kyoto, Japan). With participants seated upright with their back supported and feet firmly resting on the floor and not crossed, arms resting and palms facing up the antecubital fossa was positioned at the level of the heart. An appropriately-sized cuff was placed on the arm about 2 cm above the antecubital fossa, and not restricted by clothing. The participant was asked to relax for three to five minutes before systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse rate were measured. These measurements were repeated two more times at two-minute intervals. The mean of the last two measurements was used to calculate the final average systolic and diastolic blood pressure results and pulse rate. Blood glucose levels were measured using OneTouch Select®, an electronic point-of-care glucometer. The mean blood glucose levels were interpreted as fasting or random depending on whether the individual had an overnight fast prior to measurements or not. Data collected in the nested longitudinal phase included, medication/treatment, blood pressure levels and blood glucose measurements.

Definitions of terms

Hypertension was suspected when the average of two systolic blood pressure measurements was ≥140 mmHg and/or diastolic blood pressure≥90 mmHg. Confirmation was conducted within two weeks of initial

measurements at the referral facility. ***Confirmed hypertension*** was defined using recognised global and national guidelines as systolic blood pressure≥140 mmHg and/or diastolic blood pressure≥90 mmHg; and or individuals who reported being previously diagnosed by a healthcare professional and or on medication for hypertension at the time of data collection presenting one or more of the following conditions: systolic blood pressure ≥ 140 mm Hg, diastolic blood pressure ≥ 90 mm Hg, or the participant reported that they were currently taking medication for hypertension [12]. ***T2DM*** was defined as fasting plasma glucose concentration ≥7.0 mmol/L, or a random plasma glucose concentration >11.1 mmol/L, or a previous diagnosis by a health professional or on medication [13]. ***Awareness*** of hypertension or T2DM was evaluated using the question, "Have you ever been told by a doctor, nurse, or other health care worker that you have hypertension or diabetes (high blood pressure or high sugar levels)?" The response to this question was used as an indicator of self-reported hypertension and in conjunction with the measured blood pressure and blood glucose we were able to compute awareness levels. ***Treatment*** levels were computed as a proportion of those confirmed with hypertensive or T2DM who were receiving medication for the conditions. Adequate ***Control*** of hypertension referred to those on treatment who had a systolic blood pressure <140mmHg and or diastolic pressure <90mmHg while adequate control of T2DM referred to those on treatment with a fasting blood glucose of <7mmol/L or random blood glucose less than or equal to 11.0mmol/L. These definitions have been previously used in literature and in this study setting [4, 6].

Table 1 Sociodemographic characteristics of the study population

	Frequency (*N* = 631)	Proportion (%)
Mean age in years (± Standard Deviation) *	49	± 16
Age categories		
< 35 years	123	19.5
35–75 years	461	73.1
> 75years	47	7.4
Sex		
Male	172	27.3
Female	459	72.7
Faith-Based Centres		
FBC01 Church of Pentecost	56	8.9
FBC02 Roman Catholic Church	288	45.6
FBC03 Paga Mosque	87	13.8
FBC04 Presbyterian Church	40	6.3
FBC05 Church of the Lord Mission	63	10.0
FBC06 Good News Bible Church	97	15.4
Religion		
Christian	534	84.9
Muslim	90	14.0
Traditionalist	7	1.1
Ethnolinguistic group		
Kasem	500	79.2
Nankam	69	11.0
Other	62	9.8
Marital status		
Married	368	58.3
Single	73	11.6
Divorced	24	3.8
Partner deceased	166	26.3
Educational status		
No formal education	186	29.5
Primary	118	18.7
Secondary	212	33.6
Tertiary	115	18.2
Employment status		
Employed	468	74.2
Not employed	163	25.8
Household density†	2	IQR (1–7)
Distance to the nearest health facility		
< 5 km	395	62.6
5–10 km	203	32.2
> 10 km	33	5.2

*FBC, Faith Based Centre; * SD, standard deviation; †IQR, interquartile range.*

Statistical analysis

Descriptive and inferential statistics were used to summarise the medical screening data. The Shapiro-Wilk test (sktest) was used to assess the distribution of continuous variables. A "sktest" with a $p<0.05$ was considered skewed. Normally distributed continuous data are described as mean ± standard deviation (SD) and non-normally distributed variables were described as median (interquartile range). Proportions were used to describe categorical data. Pearson's chi-square (X^2) test was used to compare categorical data while Student t-test and Mann–Whitney *U*-test (Two-sample Wilcoxon rank-sum) were used for normally distributed or skewed continuous data respectively. Statistical analyses were performed using the statistics program STATA, version 18 (StataCorp, College Station, TX, USA) and level of statistical significance was set at 5% ($p<0.05$).

Results

Description of the study participants

Table 1 shows the descriptive statistics of the screened individuals. A total of 631 individuals were screened from six FBCs (five churches and one mosque). The age range of participants was 18–82 years, with a mean ± SD (standard deviation) of 49 ± 16 years. The majority of the study participants (73.1%) were within the 35–75 years age group. Approximately 73% were females. About 84.9% of those screened were Christians and 14.0% were Muslims.

The majority of screened individuals were married and 29.5% had no formal education. About 62.3% lived within 5 km from a health facility.

Distribution of risk factors

The overall prevalence of smoking was 14.5% with more men likely to smoke than women. There was no difference in alcohol intake between men and women with an overall prevalence of 55.3%. More than half of the participants were physically active with men more likely to report 150 or more minutes of moderate-to-vigorous physical activity per week. Nearly half of the study participants used salt or salty sauce always as opposed to majority rarely taking processed food. The prevalence of obesity was 25.5%; more women were obese while more men were underweight. Women had a higher WC, HC and WTHR compared to men (Table 2).

Table 2 Sex distribution of behavioural and metabolic risk

	All	Female	Male	*P*-value
	N = 631	459 (72.7)	172 (27.3)	
Behavioural risk factors				
Smoking - in the past 1yr				
Yes	28 (4.4)	9 (0.65)	25 (14.5)	< 0.001
No	603 (95.6)	456 (99.3)	145 (85.5)	
Alcohol - in the past 1yr				
Yes	349 (55.3)	253 (55.1)	96 (55.8)	0.876
No	282 (44.7)	206 (44.9)	76 (44.2)	
Fruits and vegetables intake*	3 (2–12)	3 (2–8)	3 (2–9)	0.266
Fruits and vegetables intake				
< 5 servings per day	127 (72.9)	92 (72.4)	35 (74.5)	0.072
5 servings per day	42 (24.5)	35 (27.6)	12 (25.5)	
Physical activity				
< 150 min per week	279 (44.0)	217 (47.3)	61 (35.5)	0.008
150 min per week	353 (55.9)	242 (52.7)	111 (64.5)	
Salt and salty sauce				
Always	312 (49.5)	231 (50.4)	81 (47.1)	0.227
Rarely	300 (47.6)	217 (47.4)	83 (48.3)	
Never	18 (2.9)	10 (2.2)	8 (4.6)	
Processed food				
Always	70 (11.1)	49 (10.7)	21 (12.2)	0.865
Rarely	482 (76.5)	352 (76.9)	130 (75.6)	
Never	78 (12.40	57 (12.4)	21 (12.2)	
Metabolic factors				
BMI in kg/m^2				
Underweight	19 (3.0)	12 (2.6)	7 (4.1)	0.001
Normal weight	259 (41.1)	172 (37.5)	87 (50.6)	
Over weight	192 (30.4)	139 (30.3)	53 (30.8)	
Obese	161 (25.5)	136 (29.6)	25 (14.5)	
WC in cm*	85 (65–116)	89 (75–116)	84.2 (72–107)	0.002
HC in cm – mean ± SD	100.1 ± 10.4	101.5 ± 10.6	96.4 ± 8.6	< 0.001
WTHR	0.86 ± 0.06	0.86 ± 0.06	0.87 ± 0.07	0.035

*Data presented as median (IQR, Interquartile Range) and p-value obtained using nonparametric test (Mann-Whitney U-test)

Screening outcomes and referral

Presented in Fig. 1 are data on the outcomes of screening and referrals while Fig. 2 shows facilities referred participants sort care from (2 A) as well as the category of health personnel who attended to them (2B).

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Of the 631 participants screened, 295 (46.8%) were referred on suspicion of either hypertension, T2D or other medical conditions. The prevalence of screen detected hypertension and T2DM was thus 21.4% (135/631) and 2.5% (16/631) respectively. Fifty-one and 8 of the 631 participants screened, reported having previously been diagnosed with Hypertension and T2DM respectively. Five (representing 0.8%) of those who reported previous diagnosis of Hypertension or T2DM reported having both conditions while at the end of the screening 8 (1.3%) had confirmed hypertension and diabetes combined. The incidence of Hypertension was 19.8% while that for diabetes was 2.5%. The prevalence of confirmed hypertension and T2DM was 27.9% and 3.5% respectively and that for both hypertension and diabetes was 1.3%.

A total 288 participants honoured the referral with 7 defaulters and the facilities that received the referrals were district hospitals (63.1%), CHPS (30.8%) compounds and Health Centres (6.1%) (see Fig. 2A). At the referral facilities, 35.4% were seen by a medical doctor, 49.5% were seen by other staff including general nurse, nurse prescribers and laboratory technician while 15.1% were seen by Physician assistants (Fig. 2B).

Follow up and retention in the healthcare system

The confirmed cases were followed up for 3 months. The retention in care for hypertension and T2D was 100% in month one, 98.9% in month 2 and 94.9% in the third month. The breakdown of retention per disease entity is contained in Table 3. We observed an increase in treatment and adequate control levels for hypertension and T2D over the 3-month follow up period.

Care deficits in hypertension and T2D care cascade

Among diagnosed hypertensive patients, awareness level was 52.8%, with 38.6% on treatment while 26.7% had achieved adequate control (Fig. 3A). Between confirmed diagnosis and knowledge of hypertension status, there is 31.8% deficit in care. A further 14.2% deficit in

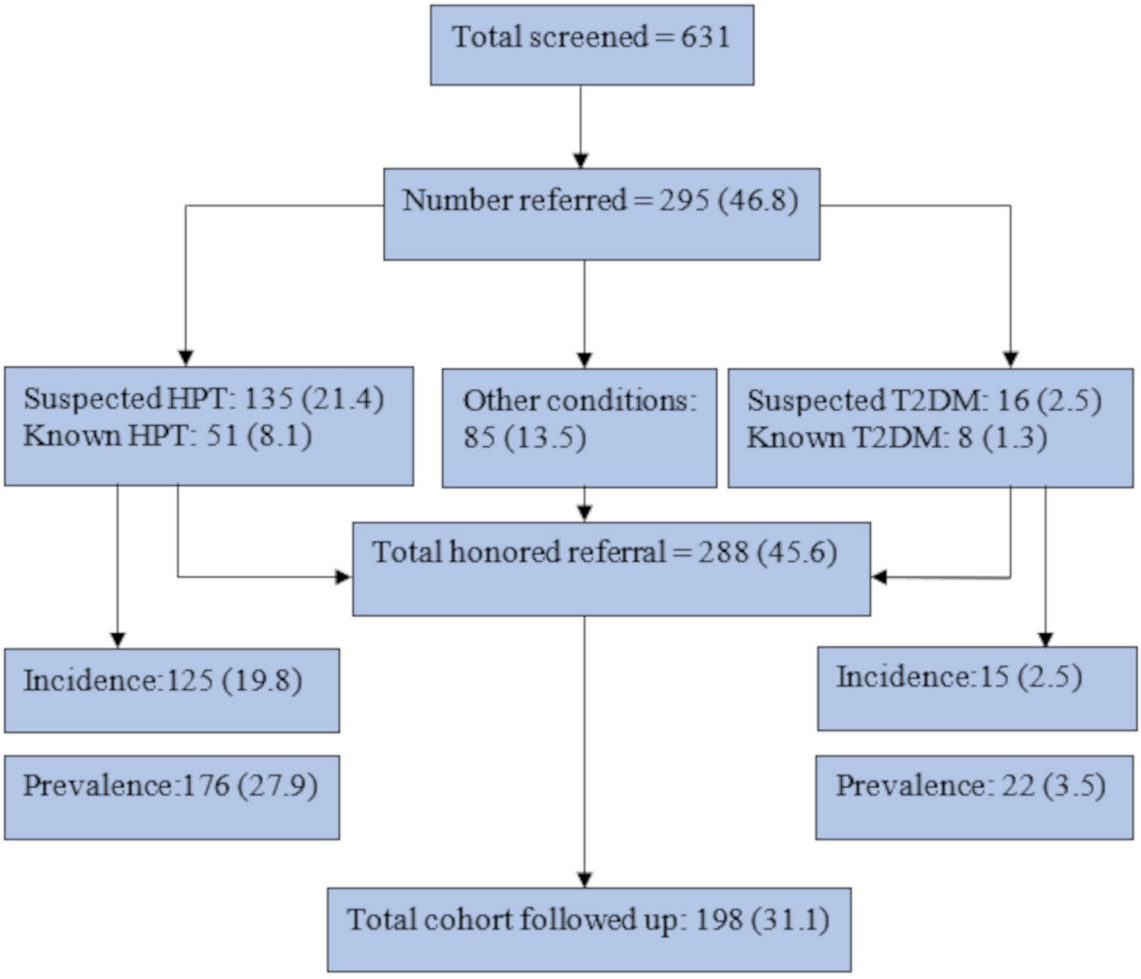

Fig. 1 A diagram showing screening outcomes and subsequent cohort followed up. Data presented as n (%); the denominator is the total number of people screened ($n = 631$). Incidence refers to all news cases diagnosed from the suspected cases while prevalence the total of known and new cases confirmed from the suspected cases

hypertension care between been aware of one's and receiving treatment for same. Finally, 11.6% deficit been on treatment and achieving adequate control. Of the 22 confirmed T2D cases, 71.4% (20/28) were aware of their disease status, 45.5% were on treatment. The corresponding deficits in the care cascade were 35.2%, 29.6% and 22.2% respectively (Fig. 3B).

Discussion

We conducted a medical screening exercise within 6 FBC in the Kassena Nankana Districts of Northern Ghana as part of a broader study investigating the feasibility of screening for hypertension and T2DM in faith-based centres for referral to the health system. From our study we observed varying burden of behavioural and metabolic risk factors. Men smoked (14.5%) more than women (0.65%) while women (29.6%) were more obese than men (14.5%). The prevalence of confirmed hypertension was 27.9% compared to a T2DM prevalence of 3.5%. A total of 295 were referred and 97.6% were linked to the healthcare system with a retention in the healthcare system of 94.9% of the cohort at the end of a 3-months follow up period. We observed deficits in hypertension and T2DM care along the care cascade with low awareness, treatment and controlled levels. A follow up showed improvements in treatment and control levels.

Communities in African countries are going through an epidemiological transition with resultant increases in burden of cardiovascular diseases and their risk factors. We found a higher level of smoking than that previously reported in (2015) by the AWI-Gen study, conducted in the same setting [4], . But consistent with our previous study and other studies in Ghana and elsewhere in Africa, which found that more men than women smoke

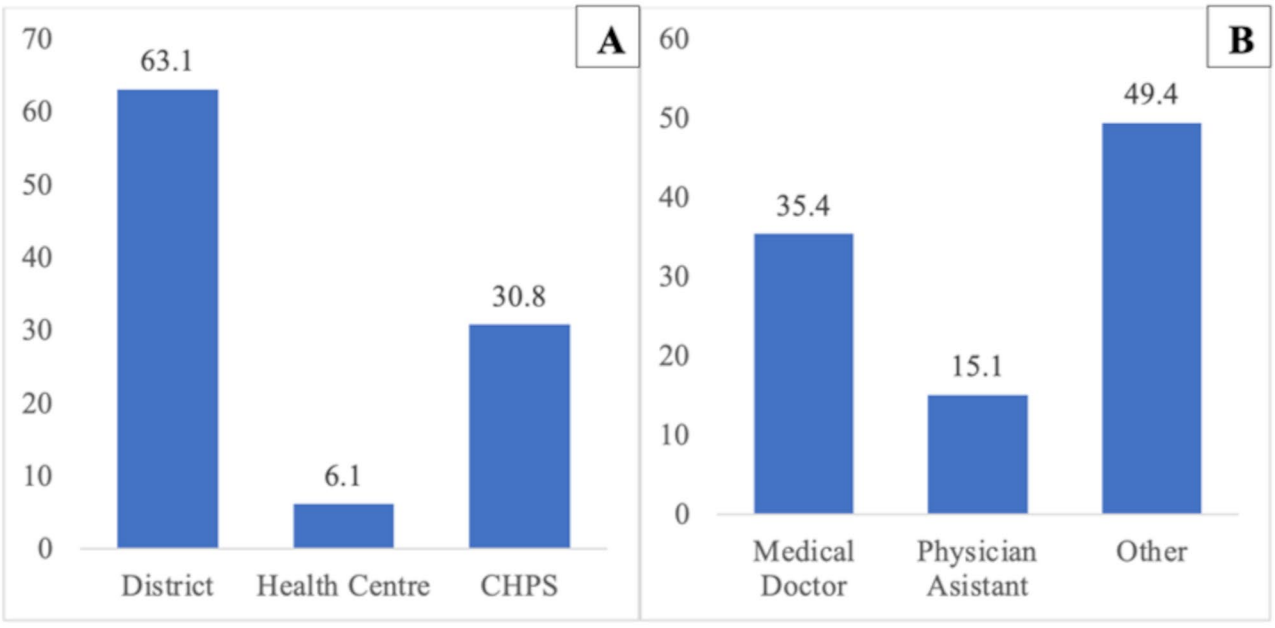

Fig. 2 Facilities and Health workers referred to in the Kasena Nankana districts; CHPS, community-based health and planning services

Table 3 Proportions retained in care, on treatment, achieved control and mean levels of blood pressure and blood glucose over 3-months follow-up period

		2 weeks	30 days	60 days	90 days
Hypertension	Retained	176 (100%)	174 (98.8%)	174 (98.8%)	168 (87.5%)
(*n* = 176)	Treatment	68/176(38.6%)	78/176(44.3%)	145/176(82.4%)	145/176(82.4%)
	Controlled	47/176(26.7%)	77/176 (43.8%)	138/176 (78.4)	141/176 (80.1%)
	Mean SBP (mmHg)	141 ± 19	134 ± 19	133 ± 19	126 ± 15
	Mean DBP (mm Hg)	86 ± 13	81 ± 13	80 ± 12	79 ± 10
Diabetes	Retained	22 (100%)	22/22 (100%)	20/22 (91%)	20/22 (91%)
(*n* = 22)	Treatment	10/22 (45.5)	15/22 (68.2%)	15/22 (68.2%)	19/22 (86.4%)
	Controlled	5/22 (22.7)	8/22 (36.4)	8/22 (36.4)	10/22 (45.5)
	Mean Glucose (mmol/L)	11.3 ± 5.8	8.9 ± 2.6	6.5 ± 2.2	5.4 ± 1.8
Total	Retained	198 (100%)	196 (98.9%)	194 (97.9%)	188 (94.9%)
(*n* = 198)	Treatment	78/198 (39.4)	93/198 (46.9%)	160/198(80.8%)	164/198 (82.8%)
	Controlled	52/198 (26.3)	85/198(42.9%)	146/198(73.3%)	151/198 (76.3%)

tobacco products [4, 6]. The observed obesity levels from our study are higher than previously recorded and shows a steady increase in obesity especially within rural communities. Consistently, it has been observed in rural and urban Ghana and other African settings than more women than men are likely to be obese [14–16]. These results show a significant increase in obesity levels among adults in this rural community from less than 10% in 2015 [14] to 14.5% in 2022. This confirms the NCD risk factor collaboration's findings that rural body mass index could be a significant driver of the global obesity epidemic [17]. It is, thus, imperative to focus efforts at addressing the rising levels of obesity.

The number of suspected cases of hypertension were 135 while 51 reported been previously diagnosed. The prevalence of confirmed hypertension from the health facilities was 27.9% while the incidence of hypertension from the screening was 19.8%. There were no statistically significant differences in prevalence between women and men. The reported prevalence is higher than 19% reported by Setor et al. 2009 [5] and higher than the 24.5% that was reported in 2015 [4]. This observation follows the general trend of increasing prevalence of hypertension in rural and urban Ghana with reported range of 18–45% [4, 6]. In this study, the greater proportion of people who reported the use of salt and salty sauce or seasoning as well as processed foods may be a contributory factor. Salt has been implicated in causing fluid and water retention and hence increases the risk of hypertension [5]. The Global Burden of Disease and the International Diabetes Federation projections suggest an increase in T2DM to between 6.1% and 11.3% by the year

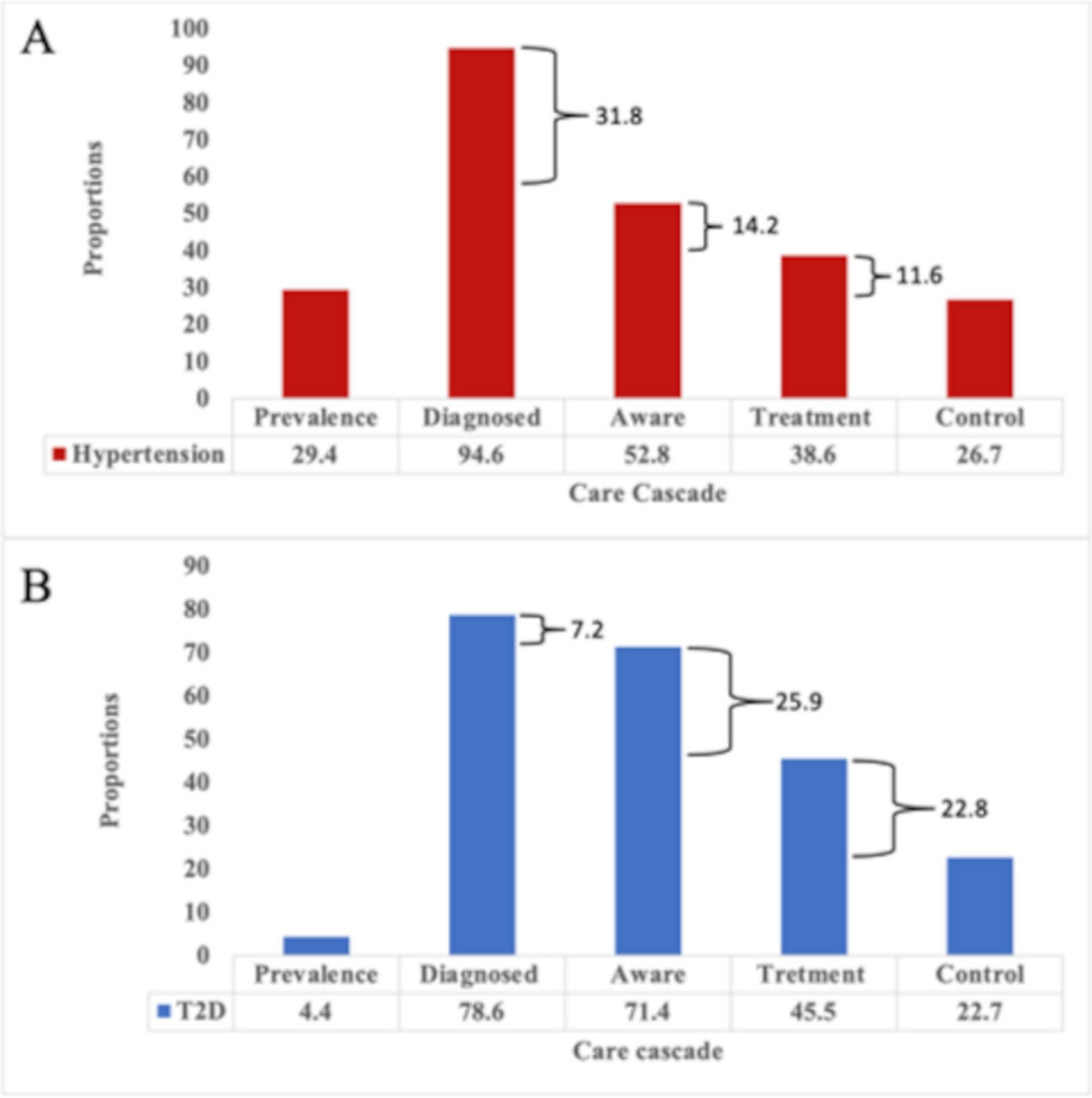

Fig. 3 Hypertension (**A**) and T2D (**B**) care cascade in the Kassena Nankana districts

2050 [18, 19]. The observed 3.5% prevalence of confirmed T2DM in this study was higher than 1.5% [5] obtained in a previous population study in the same setting conducted in 2015. This finding represents a significant increase within a 7-year period and further highlights the need to address the significant deficits in the care cascade that were reported in both studies. This finding suggests that, public health interventions should aim at expanding screening services for early detection, strengthening of surveillance system for accurate estimations and improved accessible care with a focus on the primary healthcare system.

The facilities that participants went to for confirmation and subsequent healthcare mirrors the current practice where only secondary level facilities are mandated to manage CVDs in Ghana https://www.afro.who.int/publications/who-pen-and-integrated-outpatient-care-severe-chronic-ncds-first-referral-hospitals. Hence many people preferred to access care at the district hospital. Despite this, it was not encouraging to notice that the majority of clients were not managed by medical doctors and

physician assistants but by lower-calibre of health staff. The finding may further point to shortage of critical staff and, hence the need to consider task shifting to Non-Physician Health Workers especially within the primary healthcare system.

While there are currently, several public screening exercises – such as May Month Measurement [5, 20], aimed at expanding screening as a way to addressing the low awareness levels, the persistent issue is inadequate linkage to and retention in care. Some care models such as those recently piloted by the COMBINE study in Navrongo showed promise in home-based screening and linkage to the CHPS compounds [21]. Our study achieved 100% linkage to care within the first 2 weeks following screening, then 98.9% in the first month, 98.9% in the second month, and 95.6% in the third month. This is reassuring and may be due to several factors. Firstly, we postulate that the involvement of faith leaders through encouraging members to take part and adhere to the medical advice; faith leaders themselves taking part in the screening and the screening taking place within the faith-based centres are factors that may have influenced participants participation and adherence to referrals and subsequent retention in care. Studies on the influence of religion on adherence to interventions for chronic diseases are inconclusive [22, 23]. While it is important to explore those direct mechanistic links in future studies, it is safe to suggest that health promotion and expansion of screening services could be supported by faith leaders in faith centres.

We observed major care deficits that are consistent with findings in literature. The AWI-Gen study had previously demonstrated a low awareness to hypertension and diabetes [6, 5]. Addressing these care deficits will require a robust health awareness creation and promotion campaign. It will also require expanded access to screening and linkage to the healthcare system for care as well and reliable consistent access to medication. As previously reported in our asset mapping activity, churches and mosque have social groupings [10] which can be leveraged to offer psychosocial, financial and other support needed for patients with chronic diseases. This support has the potential to aid blood pressure and glucose control levels. The effective implementation of care models that include the primary health care system have the potential for early detection, prevention of complication and subsequent reduction in premature mortalities due to CVDs as envisaged by Sustainable Development Goal 3 (SDG-3).

We therefore recommend that future interventions should aim at general health promotion messaging on risk factor reduction and improvement in quality of life of people with chronic diseases. This strategy will ensure active participation of faith leaders in health promotion and will be likely to achieve improved adherence.

To our knowledge this is the first study of investigating the feasibility of using faith-based and faith-placed to expand screening, referral and linkage of suspected hypertension and T2DM to the primary healthcare system. This is a major step as the current NOP programme in Ghana is exploring avenues for expanded screening services and linkage to healthcare system. Involvement of community stakeholders including community members, faith leaders and healthcare providers in the implementation of the medical screening enhanced the success of the intervention. We recommend future health promotion interventions to involve faith-based organisations. The use of formative study to inform the need for a medical screening on hypertension and diabetes was commendable. We observed a few limitations which include some bias response that could arise from self-reported smoking and alcohol use. Non-sampling of participants and limiting the study to just 2 districts in one region in Ghana may hinder the representativeness and generalization of the study (mentioned earlier in track changes but just modifying a little). However, our results are similar with previous population-based studies in the study setting which confirms external validity. There was no pre-testing done prior to administering the question, however the tool used had been previously used for population-based surveys in the study setting.

Conclusion

Faith-Based Centres have the potential to expand on screening, linkage and management of hypertension and diabetes. Exploring this potential may result in improved early diagnosis, led to a reduction in complications and premature mortality from cardiovascular diseases, thereby, contributing good health and well-being for all as contained in Sustainable Development Goals (SDG) 3.

Supplementary Information

The online version contains supplementary material available at https://doi.org/10.1186/s12875-024-02620-0.

Supplementary Material 1

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Author contributions
Study concept, design and fund acquisition – EAN, STC, SZ, ND, FC, SKK, CJ, SS and POA; Data collection and medical screening – EAN, STC, JAA and POA; Concept for the paper – EAN, STC, SS and POA; Data analysis and first draft - EAN; Interpretation of results and drafting of the manuscript – EAN, STC, AW, JAA, SZ, SKK, SS, and POA; All authors read and approved the manuscript for submission.

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Data availability
All data used for the analyses are available on reasonable request from the corresponding author.

Declarations

Ethics approval and consent to participate
The study received ethical approval from the Navrongo Health Research Centre Institutional Review Board (ref: NHRCIRB471). Consent was sort from the leadership of the various FBC for the medical screening, additional written informed consent was obtained from every individual prior to the screening where possible, with fingerprint consent taken from participants who could not sign. All research procedures were conducted according to ethical principles as outlined in the guidelines and regulations such as the Declaration of Helsinki.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Author details
[1]Navrongo Health Research Centre, Ghana Health Service, Navrongo, Ghana
[2]Department of Epidemiology, School of Public Health, CK Tedam University of Technology and Applied Sciences, Navrongo, Ghana
[3]Julius Centre for Health Science and Primary Care, Julius Global Health, University Medical Centre Utrecht, Utrecht University, Utrecht, the Netherlands
[4]School of Public Health and HRB Clinical Research Facility, University College, Cork, Ireland
[5]Noguchi Memorial Institute for Medical Research, University of Ghana, Accra, Ghana
[6]Leicester NIHR Biomedical Research Centre, College of Life Sciences, University of Leicester, Leicester, UK
[7]Leicester Diabetes Centre, University of Leicester, Leicester, UK
[8]Section of Cardiology, Department of Internal Medicine, Rady Faculty of Health Sciences, Max Rady College of Medicine, University of Manitoba, Saint Boniface Hospital, Winnipeg, MB R2H 2A6, Canada
[9]Department of Neuroscience, Psychology and Behaviour, University of Leicester, Leicester, UK

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