# Type 2 Diabetes health prevention program in Burkina Faso

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**Laurea University of Applied Sciences** **Abstract**
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Diabetes is one of the main reasons for disabilities and deaths in developing countries and especially in the African countries. Burkina Faso is one of the African countries which is facing difficulties in coping with the rising burden of non-communicable diseases because of rapid lifestyle changes and increasing urbanization. (WDF 2014.)

The aim of the study was to increase knowledge, among women in Moami village (Burkina Faso), about type 2 Diabetes prevention with producing a prevention program material which includes picture teaching cards. The aim was to answer on the question: based on the previous research, what key factors needed to be considered when creating a health promotion campaign for women in sub-Saharan Africa. The objectives were to study previous research about type 2 Diabetes in Sub-Saharan African countries and how to prevent it. The objectives were to analyze relevant information about different factors which have an impact on the huge level of Type 2 Diabetes in Burkina Faso, but also the factors which possibly need to be considered when conducting this kind of prevention program, in a culturally sensitive way. The purpose was to create an intervention material about type 2 Diabetes prevention for the workshop, and to create a tested health intervention material to share with Adamadeya ry. The partner of the study was Laurea University of Applied Sciences, and Adamadeya ry, a non-governmental organization based in Finland and Moami village (Burkina Faso). The representative person from Adamadeya ry is Venla Ouattara.

The study design was a small-scale intervention study. The intervention was a health education program about type 2 Diabetes prevention. The study method was a literature review which resulted in the workshop material for the health education program. The feedback from participants were positive and they felt that the workshop was effective, and they did not see any need for further development of the workshop material.

The ways to provide information and how to support people in preventing type 2 Diabetes in Burkina Faso, should be developed. A culturally sensitive approach should be utilized in the prevention material. It would be beneficial to carry out a follow-up studies where the long-term results could be revealed.

Keywords: Type 2 Diabetes, prevention, women, Burkina Faso, Sub-Saharan Africa

Contents

# 1 Introduction

Burkina Faso is a low-income West-African country, with population of nearly 23 million people in 2021 (IFRC 2021a). The country has limited natural resources, and its economy is largely based on agriculture, which employs approximately 80 per cent of the workforce. Although, lately gold export has also increased. Despite of the progress the country has made, Burkina Faso does face several development challenges, particularly in the areas like health and education. (The World Bank 2022.) The population of Burkina Faso has grown fast, and this is one of the reasons which has created a challenge to provide health care and health education for Burkinabe people. The World Bank (2022) highly recommends that Burkina Faso would put more emphasis on health education and health services.

Diabetes is surging in developing countries such as Burkina Faso, especially in urban environments. Prevalence of Diabetes is associated significantly with the metabolic syndrome and with a high prevalence of major cardiovascular risk factors such as hypertension and obesity. This rapid growth in Diabetes prevalence and cardiovascular risk factors in developing countries, and especially in sub-Saharan Africa, represents a growing challenge for every individual, communities, health care providers and for all medical, political, and economical participants. There is clearly an urgent and unmet need to strengthen different prevention programs. (Chetty, Govender, Govender & Reddy 2021.)

European Centre for Disease and Control (ECDC 2022) report that health education is aiming to influence in positive way to individuals' health related knowledge, attitudes, and behaviors, and add the knowledge about lifestyles and behaviors that prevent illness. Through health education, people can learn how to take care of their personal and others health. World Health Organization (WHO 2022b) state that when people's knowledge and social skills is increased, it will be more efficient to help them to make healthier choices and decisions which will affect them and their families.

This study with its aim and objectives was conducted by a master's student at Laurea University of Applied Sciences. The most driving factor behind this study is the possibility to combine health education, global health promotion with including picture cards to support the education among participants who have language barriers or low literature level. Through the whole project, the main point was to provide a real life, practical and useful results to be used on the field of global health promotion. The aim of the study is to produce a prevention program material which includes picture teaching cards, to support the education program in culturally sensitive way, to women in Moami village in Burkina Faso. The objectives in the study are to create a health promotion material, which would be supported with a picture

cards, for the health promotion workshop, and collect information from a test group about the workshop and update it based on the feedback. The target group will be women from Moami village in Burkina Faso.

This study investigates what need to be considered when creating a health promotion campaign for women in Moami village in Burkina Faso. The intervention is a material for Type 2 Diabetes prevention workshop and visual picture cards to support the material. Test group gave verbal feedback about their experiences of the workshop and the workshop material was updated based on their answers. A small-scale intervention study with effective literature research was used, and the intervention were created by applying a health promotion theory which was the health belief model.

The project's partner, Adamadeya ry is a non-governmental organization which has been founded in 2014. Adamadeya ry does mean humanity in Dioula language which is largely spoken in Burkina Faso. Adamadeya ry is registered in Finland and Burkina Faso, and its purpose is to support schooling and health and well-being in cities and villages in Burkina Faso. The NGO is emphasizing specially to support women and children and most vulnerable members of the community. The projects which the NGO is implementing, is always designed based on the needs of the local people. Empowering and equality is their operating principles. The contact person throughout the study will be Venla Ouattara, one of the founders from Adamadeya ry. (Adamadeya ry 2020.)

# 2 Background

## 2.1 Diabetes

Approximately 422 million people worldwide have diabetes and majority of them live in low- and middle-income countries, and 1,5 million deaths are directly connected to diabetes, every year. These numbers have been risen steadily over the past few decades. (WHO 2022a.)

Diabetes is one of the most rapidly growing disease in the whole world. Diabetes is commonly shared to two different types based on their etiology: Type 1 and Type 2 Diabetes. These two are presenting the extreme of each other and between these two types of Diabetes does fit multiply different patient who have symptoms from both types of Diabetes. Diagnosing Diabetes rarely base only on the etiology and that is why defining the type is often very subjective. Based on the etiology and symptoms of Diabetes, Diabetes can be shared into more detailed diagnoses which are Type 1 Diabetes, Type 2 Diabetes, LADA (Latent Autoimmune Diabetes in Adults), Secondary Diabetes, MODY (Maturity-Onset Diabetes of the Young), Mitochondrial Diabetes (mithocondrial diabetes with deafness, MIDD), Gestational Diabetes and Neonataldiabetes (NDM). (Käypä hoito 2020.)

Diabetes is well known as a chronic and metabolic disease which is characterized by elevated blood glucose levels and that leads with time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. The most common Diabetes type is type 2 Diabetes, usually seen with adults and that occurs when the body start resisting insulin or does not make enough insulin. The prevalence of type 2 Diabetes has risen dramatically in countries where is all income levels. To be mentioned, the type 1 Diabetes is a chronic condition where the pancreas produce only little, or it does not produce any insulin by itself. (WHO 2022a.)

## 2.2 Type 2 Diabetes

Type 2 Diabetes (T2D, DM2) is a heterogenous disease group which is lacking clear diagnostic criteria. The most common form of DM2 starts in adulthood when often the patient is overweight and have a high blood pressure or metabolic syndrome. Heritage and environmental factors have impact on developing DM2. The lack of insulin and insulin resistance are often part of the sickness. Insulin resistance increase the need of insulin which mean that the producing insulin is insufficient based on the need. The risk to have DM2 is also connected to different psychosocial factors (e.g., long-term stress, sleeping problems, depression) and socioeconomic load factors. The risk to have DM2 is doubled if other of the parent have DM2 and fivefold if both parents have DM2. Diabetes is underdiagnosed and even half of the DM2 cases is undiagnosed. (Käypä hoito 2020.)

The need to urinate often, thirst, constant hunger, weight loss, fatigue and visions changes are common symptoms of Type 1 Diabetes, and these symptoms often occurs suddenly. Symptoms of DM2 are often very similar than on DM1 but are often less marked. This is one reason why Diabetes may be diagnosed much later than the complications have already risen. These symptoms are caused by increased level of sugar in blood when there is not enough insulin in the body, or the insulin doesn’t work enough. (WHO 2022a.) Some of the symptoms on DM2 can be tiredness, especially after a meal, depression, edginess, feet pain, vision impairment and sensitivity to infections (Diabetesliitto 2022).

## 2.3 Type 2 Diabetes prevention

At the moment, type 1 Diabetes cannot be prevented. There are very effective approaches available to prevent type 2 Diabetes and for to prevent the complications and premature deaths which can be resulted from all types of diabetes. These approaches include different policies and practices across whole populations and in settings like school, home, workplace which can contribute to good health for everyone, such like exercising regularly, eating healthily, avoiding smoking, and controlling high blood pressure and lipids. It is important to understand that smoking does increase the risk of Diabetes and cardiovascular disease. It is good to also understand that regardless of what type of diabetes people have, these interventions can improve patient incomes. (WHOb 2022.)

Type 2 Diabetes can be prevented effectively with weight control, diet and exercise. Having a normal weight can stall the risk to have DM2 for several decades. Preventative actions are very important in cases when the risk to develop DM2 is higher. People who have parents with DM2 or have had Gestational Diabetes are in higher risk to develop DM2. Based on wide Finnish research, already losing couple of kilograms will reduce the risk to develop DM2 among people who are in high risk. (Terveyskirjasto 2021.)

The patient is often the responsible one of their own care of Diabetes and that is why it is important to concentrate on each individuals personal resources and into guidance of self-care and life habits. Psychosocial and socioeconomic risk- and resource factors and life quality should be taken into consideration when preventing type 2 Diabetes and coronary diseases and when treating and guiding patient on type 1 and type 2 Diabetes. (Käypä hoito 2020.)

When lifestyle changes are successful (losing weight, adding sport, having a diet which is high fibered and having less hard fat and moderately soft fat) will halve the risk to get DM2 in the cases when the person have weakened glucose tolerance or increased fasting value of glucose concentration. Based on behavioral science theories and previous research, in prevention and lifestyle guidance most effective ways is multi-professional interventions which are tailored based on the groups and individual's needs. The effectiveness of life guidance interventions to the risk to develop DM2 seems to last years even after the guidance. Having daily, at least 30minutes of moderately strenuous endurance-type exercise can prevent DM2. The risk to have DM2 can be reduced by following the general nutrition recommendations. It is important to understand that having a medication will never be a preventative way on DM2. (Käypä hoito 2020.)

The probability of DM2 does increase if the person is overweight (especially central obesity), diagnosed previously with glucose metabolism disorder, having high age, diagnosed with gestational diabetes, coming from the family with Diabetes, lacking physical exercise, diagnosed with high blood pressure, diagnosed with sleeping apnea, having sleeping problems, having medication (e.g., diuretics, non-selective beta blockers, statins, neuroleptics), diagnosed with arterial disease, having psychosocial and socioeconomical load (e.g., long lasting stress) or diagnosed with depression and having prescription of medication to treat it or of some other psychoactive drugs (e.g., clozapine and olanzapine). Glucose metabolism disorders are common with patient who have cardiovascular disease and especially among patient who have had heart failure or stroke. (Käypä hoito 2020.)

The risk to develop DM2 can be reduced by following the general nutrition recommendations and by paying extra attention to quality of carbohydrates and fat and to reducing the energy density of food. Total intake of carbohydrates is not connected to the risk of DM2. Plenty of

fiber-rich whole grain products in diet have been proven to decrease the risk of DM2 and coronary diseases. Heavy use (most of the studies define it to be 1-2 glasses per day) of drinks which have been sweetened with sugar (fizzy -drinks and juices) have connection to higher risk to DM2 and metabolic disorder. Diet which includes less carbohydrates and more proteins from animals and more fat increase the risk to DM2 and especially among men. Heavy use of red meat and meat products have connection to elevated risk to have DM2. Mediterranean diet seems to have impact to lower the risk to have DM2. Based on recent studies, D-vitamin supplement does not reduce the risk to have DM2. (Käypä hoito 2020.)

Based on previous evidence, including large-scale randomized control trials, Type 2 Diabetes can be prevented or delayed in up to 58 per cent of patient with maintaining a healthy weight, having regular physical activity, making healthy food choices, managing blood pressure and cholesterol levels and not smoking (CDC 2022).

The most important part to prevent Diabetes is to control weight and to lose weight if it is needed, regular activity and healthy, versatile nutrition which follow the general nutrition recommendations. Already 5-10 per cent weight lost will evidentially decrease the risk to develop DM2. Recommended diet includes vegetables, fruits and berries, whole grains, soft fat, like rapeseed- and olive oil, nuts, low fat dairy products and fish. The risk to develop DM2 will increase if the person uses high number of sugary drinks, red meat, and other meat products. (THL 2022.)

The Finnish Diabetes prevention research (DPS) was the first one to prove that it is possible to prevent type 2 Diabetes with changing lifestyle habits. These lifestyle goals in DPS-study were losing weight (>5%), fat in moderation (<30% of the whole energy income), little saturated fat (<10% of whole energy income), fibers (15g/1000kcal) and exercise about 30 minutes per day (4 hours/week) or more. The risk was more decreased when people achieved more of the goals. (THL 2022.) The intervention used on DPS study were based on the Diabetes prevention study model which proves that incidence of diabetes was able to be reduced with small and permanent lifestyle changes. The intervention models can be group guidance, individual guidance, and different educational workshops. (Peltonen 2007.)

When eating healthy way, it is good to pay attention to eating rhythm, the whole amount of the food and the amount of energy you receive and to the quality of carbohydrates, proteins, and fat. It is recommended to eat approximately between 3-4 hours when the person is awake. Regular eating rhythm includes commonly breakfast, lunch, dinner and when it is needed 1-2 snacks. This will help to control the sizes of each meal, to keep the blood sugar levels steadier and it will help with wight control. (THL 2022.)

## 2.4 Burkina Faso

Burkina Faso (The land of the upright/honest people) is a country which is landlocked and located to West Africa. Burkina Faso is one of the poorest countries in the whole world. The northern part of Burkina Faso lies geographically in the Sahel zone which is the transition zone between the Sahara Desert in north part and in the south part is tropical savanna. The country is bordered in northwest by Mali, northeast by Niger, southeast by Benin and in south by Ivory coast, Ghana, and Togo. The whole country covers 274,222 $km^2$ area. (IFRC 2021.)

The capital city in Burkina Faso is Ouagadougou and the population is nearly 23 million people. The spoken languages in Burkina Faso are French (official) and several native languages like Mossi, Fulani and Dioula which are spoken by approximately 90% of the Burkinabe population. There are 63 different ethnic groups in Burkina Faso, which are Mossi (nearly half of the whole population), bobo, Mande, Lobi, Fulani, Gourounsi and Senoufo. Main religions in Burkina Faso are Muslim 55%, Christian 25%, and other traditional beliefs 20%. (IFRC 2021.)

The population of Burkina Faso is growing nearly three per cent a year and more than 40 per cent of the population are under the age of 15 (BMZ 2022a). The high level of population growth is a major challenge because it makes difficult for policymakers to reduce poverty, create sufficient jobs, establish food security, and create to all people access to drinking water, energy, health care and education facilities (BMZ 2022b). The level of the literacy has improved accordingly but still approximately 60 per cent of Burkinabe people aged 15 or over are still lacking basic reading and writing skills. Specifically in the age group between 15- and 24-year-old, the figure has fallen to around 40 per cent. (BMZ 2022a.)

More than 40 per cent of the population lives below the poverty line. The World bank's human capital index ranks Burkina Faso 144$^{th}$ among 157 countries. Since 2015, Burkina Faso has been targeted by terrorist attacks which have resulted in population displacements. By January 2022, more than 13 per cent of educational institutions were closed because of the insecurities in environment. (The world bank 2022.) In the regions which have been mostly affected by crisis, numerous of health centers and schools have had to close. Furthermore, the food situation is critical in Burkina Faso. According to the World Food Programme, in summer 2021 more than 2.8 million people were affected by food insecurity. (BMZ 2022a.) Because of the increased amount of violence against civilians and a lack of access to basic essential services like health and education, the amount of people in need of humanitarian assistance is constantly increasing in Burkina Faso, between January and June 2020 the amount of people in need increased from 2.2 million to 2.9 million people. During June 2020, 289 health centers were operating only on minimum or not functioning at all which deprived

1.5 million people from access to care. Clearly the growing security crises have worsened the health situation in Burkina Faso. (IFRC 2021b.)

Most people in rural Burkina Faso live from agriculture. The buildings in rural villages are composed of huts which are built by using soil, wood, and straw. Families in rural areas are often poor. There is not available electricity and water is collected from wells or dams. Both, adult, and children are often uneducated. Normal traditional food, in Burkina Faso, includes cereals (millet, sorghum, maize), vegetables (wild herbs, baobab leaves, peppers, the fruit of Parkia biglobosa tree called Neré or tomatoes) and legumes (Niébé commonly called cowpeas, Vigna unguiculata). There is usually shared in families one main meal which is made of Tô which iss a thick porridge made from ground millet, corn or sorghum and it is served with sauce, which is made from vegetables, peanuts, soumbalá (a condiment which is made of seeds of Néré) and herbs. Sometimes there can be added a small piece of meat in Tô (mostly goat, sheep, and chicken) or dried fish. Bouille is a liquid porridge which is made with millet, peanuts, sugar and soy and it is usually served for young children. (Casari, Monica, Banci, Diallo & Scarallo 2022.)

In semi-urbanized areas, in Burkina Faso, the houses are often in groups and made of bricks and only some families might have access to private water sources, but all often them still use public wells. There is rarely electricity in the houses and households commonly host livestock in their yards. People diets are predominantly plant-based but some of the products can be different, like cereal flour, rice, legumes, meat, fruit, and dried fish is bought from the bi-weekly local market. People rarely eat highly processed and western-like food. Education is often low among adults and especially among women. (Casari et al. 2022.)

In urban areas live often wealthy families and the houses are made of concrete or bricks, and they have access to private water source and electricity. Families have a typical Burkinabe diet which is rich in whole grain cereals like millet, sorghum and maize, fruit, legumes, and vegetables. As addition to this, the rapid urbanization brings a wider food availability and variety of processed food like fruit juices, snacks, bakery products and sweets. Education levels in urban areas are high. (Casari et al. 2022.)

Transport is mainly via motorized vehicle such as scooters and cars and lifestyle are generally sedentary in urban areas and in areas which are rural or semi-urbanized, the transport is commonly via foot or bicycle, and they do physical work and due that they are having more active lifestyle (Casari et al. 2022).

### 2.5 Type 2 Diabetes in Burkina Faso

World health organization’s Diabetes country profile from Burkina Faso in 2016, show prove that number of diabetes deaths and attributable to high blood glucose were more common

among females in all ages. Prevalence of diabetes and related risk factors like overweight, obesity and physical inactivity are more elevated among females. (WHO 2016.)

Diabetes is not anymore, a rare disease in the adult active population of Burkina Faso and it is a significant burden in both rural and urban areas. Health policies which promote healthy lifestyle are desperately needed to give precedence to the prevention in a context where the country is under-resourced. Three out of four people with Diabetes does live in low-and-middle-income countries and it is well known contributing factor to heart diseases and stroke. The burden of Diabetes creates a rising challenge for the health systems of African countries where the health care provision is mainly shaped to battle against emergencies and outbreaks of infectious diseases. Often the education and training are not adapted to chronic conditions. (Millogo, Bicaba, Kouesyandé Soubeiga, Dabiré, Médah & Kouanda 2018.)

In Burkina Faso the national response to Diabetes does not include policies, guidelines or monitoring of Diabetes, only national risk factor survey in which blood glucose was measured were able to be founded. The availability of medicines, basic technologies and procedures in the public health sector were not generally available. (WHO 2016.)

It is interesting that in many African countries the prevalence of type 2 diabetes is significantly higher amongst women than men, irrespective of age and sex. This might be associated with sociocultural factors such as varying behavioral patterns between women and men, which does influence to their nutritional patterns, lifestyle and attitudes towards treatment and prevention. (Chetty et al. 2021.)

World health organization has been working for to integrate diabetes into primary care in multiply African countries and Burkina Faso is one of them. Integration is conducted by using the WHO package of essential noncommunicable disease interventions toolkit which is called as PEN. (WHO 2022c.)

Most of the key factors of Diabetes are socioeconomic status, obesity, physical inactivity, and growing urbanization. Lifestyle related factors does play a very important role in the occurrence of Diabetes. There have not been found any significant association between gender and blood glucose regulation status in Burkina Faso. Smoking status, obesity, greater age and total cholesterol level have been founded to have significant association with Diabetes. The ageing is a risk factor for Diabetes, and it has been showed that age groups between 45-54 and 55-64 years were more likely to have diabetes compared to the age group of 25-35 years. People who are malnourished with overweight or obesity were more likely to get Diabetes than those with a normal BMI. (Millogo et al. 2018.)

People living in rural areas have still traditional and rural lifestyle but the changes in diet and lifestyle is already shown evidently in urban areas. In urban areas, people have more

diversified diet which include hyper-caloric foods which are rich in total and contain saturated fats, cholesterol, animal protein and sugar, added salt, and poor level of fibers. The changes are promoting habits which include unhealthy diets and lifestyle, such as less consumption of fruits and vegetables an increased energy intake, harmful alcohol consumption, smoking and sedentary lifestyle. Overweight and obesity is gradually increasing among urbanization level. (Casari et al. 2022.)

## 2.6 Health promotion theory

Definition of the theory is “a set of statements or principles which are devised to explain a set of facts or phenomena, especially the one which has been tested repeatedly or which is widely accepted, and which can be used to make prognosis about natural phenomena.” A theory can be obtained inductively or deductively but is not discovered. Theory can be used to guide research, and the findings based on a given theory and may be compared to increase generalizability across studies. Intervention effectiveness framework has been studied in relationship to theory, and the results has shown that interventions with a theoretical basis might be more effective than studies without, and that when the studies are guided by multiple theories the results might be even more effective. It proved that improved healthcare outcomes do depend on changes in clinical and/or consumer behavior in the real-life context and theories which explain how different interventions effect on behavior changes and incorporate social aspects are particularly very useful. (Monsen 2017, 10-12.)

## 2.7 The health belief model

The health belief model is designed to explain health behavior by better understanding of individuals health beliefs. This model suggests that the possibility that individual acts related to a given health problem is based on the interaction between different kinds of beliefs. The health belief model predicts that individuals will take action to protect or promote health when:

- the person perceives themselves to be susceptible to a condition or problem;
- the person believes that it would have a potential serious consequences;
- the person receives cues for action which may trigger a response;
- the person believes that a course of action will be available which would reduce their susceptibility or minimize the consequences;
- the person believes that acting does have more benefit and it will outweigh possible costs or barriers; and
- the person believes that they could take effective actions (self-efficacy). (Nutbeam, Harris & Wise 2014, 9-12.)

The main benefit is how it illustrates the importance of individual beliefs about health and about the relative costs and benefits of actions which are designed to protect or improve health. Changes in knowledge and beliefs will nearly always form efficient part of comprehensive health promotion program, and the health belief model does provide an essential reference point when developing messages to improve individuals' knowledge and change in beliefs. (Nutbeam et al. 2014, 9-12.)

The health belief model does explain people's health behavior by understanding their beliefs about health. To achieve a good health is smartest to use health promotion because it is one of the most ethical, effective, efficient, and sustainable approach. It includes taking account new health challenges and understanding economic, environmental, and social determinants of individuals health and different diseases. Health belief model does improve individuals' ability to act and the capacity of groups, organizations, and communities to being able to influence the determinants of health. Communities' capacity for health promotion can be improved with practical education, leadership training and with access to the resources. When empowering individuals, it does demand more consistent and reliable access to the process of decision making and essential skills and knowledge to being able to make effective changes. This process can be supported with traditional communication methods but also with the new information media. It is important to harness all the social, cultural, and spiritual resources in innovative way. (Cragg, Davies & Macdowall 2013.)

# 3 Aim and objectives

The aim of the study was to increase knowledge about type 2 Diabetes non-medical prevention ways with producing a prevention program material which includes picture teaching cards, to support the education program, among women from Moami village in Burkina Faso.

The objectives of the study were:

1) Studying previous research about type 2 Diabetes and how to prevent it and about type 2 Diabetes in Sub-Saharan African countries.
2) Analyzing relevant information about problems and factors which possibly are the reasons for the huge level of Type 2 Diabetes in Burkina Faso.
3) Analyzing relevant factors which possibly need to be considered when conducting this kind of prevention program, in culturally sensitive way, in Moami village in Burkina Faso.
4) Creating a visual intervention material about type 2 Diabetes prevention for the workshop.

5) Creating a tested health intervention material to share with non-governmental organization, Adamadeya ry.

The research question was: based on previous research, what key factors need to be considered when creating a health promotion campaign for women in sub-Saharan Africa?

## 4 Research design and methods

Familiarizing and planning the thesis started with the mapping the environment which included finding the partner for the project, designing PICO(t)-model to assist the research, and identifying the target group, after this process the thesis topic analysis was presented in May 2022.

PICO model was used for this study (Table 1) to help in background search. A PICO model includes population, intervention of interest, comparison intervention, outcome of interest, and sometimes it can also include time, and it can be used effectively in intervention research to help search information for the background and to identify for example keywords which will be useful to start the intervention process. Using PICO question throughout the literature search will quicken the search and lead to the elimination of nontargeted and irrelevant studies. (Melnyk & Morrison-Beedy 2012, 6.)

| | | |
|---|---|---|
| **P** | **Population** | Women in Moami Village in Burkina Faso. |
| **I** | **Intervention** | Collecting information concerning Type 2 Diabetes prevention intervention. |
| **Co** | **Comparison** | Moami Village and Adamadeya ry organization. |
| **O** | **Outcome you would like to measure or achieve** | Create a teaching material and picture cards for the partner organization concerning Type 2 Diabetes prevention. |

Table 1: PICO model for type 2 Diabetes health prevention program

Data was collected for the theoretical background by using previous studies and articles between June and July 2022. The information about different factors was collected from

previous studies, from the Adamadeya ry professionals and from the health care professionals in Moami village. Reflective observation was conducted with naming the material for workshop and choosing the study method and design and to conceptualize the abstract idea, the material for the workshop were created between July and November 2022 which led to thesis plan presentation in November 2022.

The staff of Adamadeya ry were instructed to carry out the workshop. Test education program was conducted and tested, in January 2023, to a smaller group, and through the survey, feedback about the education program was collected. Attendants on the test group were all adult women over 18-year-old and there were 25 participants on the group. According to the feedback through the survey, the adjustments for the teaching program were not needed based on the data analysis. The workshop material was handed over to Adamadeya ry in February 2023 and the results were published on Theseus.

### 4.1 Small-scale intervention study

This study was carried out as a small-scale experimental intervention study. There are several different ways to define and classify intervention research in literature. In intervention study it is critical to carry out a throughout review and compound of the literature.

Intervention research is a formal step after bench science to actual use of an intervention in practice. In this small-scale intervention study the validated theoretical framework was efficient option because the plan was to test safe and efficacious intervention in real-world settings where the effectiveness has not been yet demonstrated. In this study was not tested if the intervention works in settings which are less controlled. In this study the theoretical frameworks were used and that's why both external and internal validity are as important. Positive findings do lay the foundation for translation of the intervention, and that will measure the value of providing the intervention. In this study the effects of the intervention on public health, full-scale randomized controlled trial and effectiveness of clinical trial were not used and tested, even these phases would have given the answer to the question about if the intervention associated with an expected improvement in a health problem in a real-world setting. (Monsen 2017, 4.) This study co-creates a base for future intervention studies completed in the real-world settings such as Burkina Faso.

An experimental or intervention research usually follows a five-phase development phases, which begin with a feasibility study which include the intervention which is developed and tested with small group of participants who evaluate the acceptability of the intervention. The second phase is called as pilot research (i.e., a small-scale study) and it will be conducted before a full-scale randomized controlled trial. A pilot study will give you the possibility to assess the preliminary effects of the intervention and it as well provides an opportunity to assess study burden and perfect time to collect measures. In this study the

third phase which is the full-scale randomized controlled trial and fourth phase which is called as effectiveness of clinical trial, was not conducted. Effectiveness trials will be conducted in real-world practice settings, and it is used to determine if the results from previous phase can be reproduced in real-world settings. The fifth and last phase test the effects of the intervention in public health. (Melnyk & Morrison-Beedy 2012, 40-41.)

In this study the intervention research method is implemented partially and that's why the study is conducted as a small-scale intervention research. The phases three, four and five were not conducted on this study due the fact that the study is not possible to conduct as a full-scale randomized trial which would require bigger number of participants and much longer time to conduct the study. (Monsen 2017, 4.)

Intervention research does aim to learn the best working method whit evaluating the relationship between cause and effect of an intervention and its final outcomes. There is always three critical parts which define intervention research: Impact (will the study have influence in the field), significance (will the study address an important problem or not) and innovation (will the study employ novel concept and are the study aims original). (Melnyk & Morrison-Beedy 2012, 3.) The impact of this small-scale intervention is to increase knowledge in type 2 Diabetes prevention of Moami village women, importance of this thesis is that it offers health knowledge and skills to the participants and the innovation is shown in the produced material and picture cards for the type 2 Diabetes prevention workshop.

## 4.2 The literature review

In the first part of the study the literature review was carried out in purpose to provide a proper overview of the different approaches which are currently used based on the theoretical contents about the final assessment of the type 2 Diabetes prevention. The literature research of this study was conducted by using specific search terms: "Type 2 Diabetes", prevention, intervention, "West Africa", women and Burkina Faso. Identification of the literature for this study were conducted critically, closely, and systematically through an assortment of sources with the support of an information specialist of Laurea University of Applied Science. Inclusion criterions for the data collection were publication range limited between 2012 and 2022, language limited to Finnish and English, terms, concepts, and keywords used (Table 2) and publications needed to be full text, review articles or research articles. Articles which were relevant were collected from electronic databases (Table 2). Study duplicates were rejected. The literature review of this study identified at first 666 papers, of which 13 were relevant to be used on the review after careful and critical evaluation. (Xiao & Watson 2017.)

| *Database* | *Search phrase* | *Limitations* | *Results* | *Accepted based on title and abstract* | *Finally accepted* |
|---|---|---|---|---|---|
| *EBSCO host* | Type 2 Diabetes AND prevention AND West Africa AND women | Academic journals, Full text, 2012-2022 | 26 | 3 | 1 |
| *EBSCO host* | Type 2 Diabetes AND prevention AND West Africa | Academic journals, Full text, 2012-2022 | 7 | 1 | 0 |
| *Proquest central* | "Type 2 Diabetes" AND Burkina Faso AND prevention AND women | Scholarly journals, 2012-2022 | 346 | 27 | 12 |
| *Science direct* | "Type 2 Diabetes" AND Burkina Faso AND prevention | Review articles, research articles, 2012-2022 | 79 | 4 | 0 |
| *Pubmed* | "Type 2 Diabetes" AND prevention OR intervention AND Burkina Faso | Full text, clinical trials, 2012-2022 | 208 | 5 | 0 |

Table 2: Database literature review results

### 4.3 Data analysis of literature review

Majority of the papers fitted to the category of literature reviews and that included ten papers, one study was cross-sectional study, three were case-control studies and one were quantitative research. All the 13 papers which were included in this literature review were carried out in sub-Saharan African countries. Table 4 and 5 includes details about the purpose of the study, sample, setting and study design and findings of the study. The titles and abstracts were screened according to the inclusion and exclusion criteria and relevant articles were rejected or accepted after reading the full text. To become familiar with the material and data, it was carefully read through with time. The literature review resulted findings which are presented in three themes labeled 'Importance to prevent type 2 Diabetes in Burkina Faso', 'Healthy lifestyles' and the 'Recommended interventions'. Based on the results and findings of the literature review, the workshop material was designed and created.

## 5 Results of the literature review

The results of the literature review will be discussed and analyzed on this chapter. Three themes which were resulted from the literature review include the information about which

kind of different key factors have impact to the worsened situation of type 2 Diabetes levels, in sub-Saharan African countries and especially in Burkina Faso, among women and why it is extremely important to bring T2DM prevention programs to Burkina Faso. Also, there will be discussed about the most important factors for lifestyle changes which are the main part of T2DM prevention and which kind of interventions and strategies might have positive impact to the situation. These three themes are presented in Appendix 1 and 2 which includes details about purpose of the study, study design, and findings.

### 5.1 Importance to prevent type 2 Diabetes in Burkina Faso

Goedecke et al. (2017), Utumatwishima et al. (2018) and Issaka et al. (2018) brought out that over the next 25 years, Sub-Saharan Africa (SSA) has the highest increase rates in type 2 Diabetes by it rapidly growing burden affecting mostly the population of African descent and this is leading to the fact that Africa is facing the most significant burden of type 2 diabetes including different complications and mortality in the coming decades. Non-communicable diseases have a large and growing impact to burden of death and disability in sub-Saharan Africa and these non-communicable diseases which is lifestyle-related, cause nearly half of all deaths and disabilities in low- and middle-income countries and this trend is showing that cases of NCD's will overtake infectious diseases by 2030 in SSA but even this clear and worrying trend are not getting enough attention as a public health issue in SSA. (Mudie et al. 2019; Yiga et al. 2022.)

Non communicable diseases, including type 2 Diabetes are creating a significant financial burden on individuals, families, and countries economy, including direct (e.g., medication cost, hospital payments and admission) and indirect costs (e.g., taking care of the sick person or sickness and causing loss of productivity due to work absenteeism), African countries. Prevalence of type 2 Diabetes is suggested to have a rapid global increase and in SSA countries will have the highest growth in the future. (Issaka, Cameron, Paradies, Bosyu & Houehanou 2022.)

In Sub-Saharan Africa has the highest amount of undiagnosed type 2 Diabetes, with nearly 70% of people who are unaware of having type 2 Diabetes and little below 70% of the population are unaware of type 2 Diabetes possible complications, in Sub-Saharan countries, but they are also unable to access to the correct education and health services (Goedecke et al. 2017; Issaka et al. 2018). Utumatwishima et al. (2018) notify that type 2 Diabetes is highly undiagnosed, and it is often diagnosed only after preventable symptoms have already occurred. In 2015 approximately 34.9 million African had prediabetes and it is expected to rise to 79 million in 2040, which explain that Africa has the highest rate in the whole world of undiagnosed people with T2DM. Africa has also the highest proportion of people who die from

T2DM under the age of 60 years. In sub-Saharan Africa people have much lower accessibility to health services and many people are not aware of their conditions (Mudie et al. 2019).

Utumatwishima et al. (2018), Goedecke et al. (2017) and Issaka et al. (2018) point out that the increasing prevalence of T2DM is commonly attributed to urbanization, which cause unhealthy food habits, sedentary lifestyle and increasing rates of overweight and obesity. Ageing population, increased urbanization and lifestyle changes have their attribute on high levels of type 2 Diabetes. The high prevalence of type 2 diabetes is driven also by economic expansion. Especially changes in lifestyle and urbanization have adverse health effects in Sub-Saharan African countries. (Mudie et al. 2019.) Urbanization is the leading key factor in growth of chronic diseases in Burkina Faso (Augustin, Marceline, Tougouma, Kassie & Fournet 2017). Gissing et al. (2017) underline that these changes occur more rapidly in low- and middle-income countries and the rise in obesity and type 2 Diabetes in such countries appears faster.

One of the increased public health issues, especially in low-middle-income countries is obesity. Abdominal obesity has a strong association for increased risk of insulin resistance, type 2 diabetes, other non-communicable diseases, and all-cause mortality (Kadari, Samadoulougou, Ouedraogo, Kouanda & Kirakoya-Samadoulougou 2021). Bosy et al. (2015) and Hirut et al. (2020) point out that rapidly increasing urbanization and technological development with associated change in dietary patterns and physical activity are causing that overweight and obesity is more prevalent among children and adult population in West Africa, and it is causing increased burden of cardiometabolic diseases or non-communicable diseases. Nutrition transition is not causing consequences only to people in the high socioeconomic class, but also among adults who come from the poorest households, and who are often uneducated, overweight and have hypertension and that increasing life expectancy, development of economy and urbanization are leading to more unphysical lifestyle and unhealthy diets which is associated with obesity.

Nkambule et al. (2021) study have found that there is strong evidence that association between food insecurity and main metabolic risk factors for non-communicable diseases which are diet sensitive. Food insecurity is one main metabolic risk factor which definition is the lack of access to food which is nutritionally adequate, and it is caused by poverty and other socio-economic reasons. Gissing et al. (2017), Kadari et al. (2021), Yiga et al. (2020), Nkambule et al. (2021) and Augustin et al. (2017) indicates that prevalence of obesity/overweight is higher among women in Africa, and it is almost twice as high as in men. Urbanization is an important driver for type 2 Diabetes and overweight/obesity increases among women but there are many other factors which also contribute towards overweight and obesity, particularly socio-economic status.

Being female, increased age, marital status, high level of education and living in urban areas are the main predictors of abdominal obesity. Overweight and obesity are the key determinants which are increasing rapidly in urban SSA, particularly among women who are in reproductive age. The prevalence of NCD's among women is nearly twice as high as in men. The main metabolic risk factors are more frequent among women. Chronic diseases markers are shown significantly more among urban women than men and among people from high income level.

It must be noted that Kadari et al. (2021) in their study point out that they have not found significant association with abdominal obesity and type 2 diabetes, but the result might be explained with the fact that many people who were abdominally obese may not yet have experienced the insulin resistance. Prevalence of type 2 Diabetes does not differ by gender but deaths which are attributed to type 2 Diabetes are greater in women, probably due to access to care and differences in beliefs. Little above 60% of Africans live in rural areas but majority of people who have type 2 Diabetes does live in cities and that may also have own impact on the fact why there is so large variability in type 2 Diabetes across the region. (Goedecke et al. 2017.) Issaka et al. (2022) noted that among West African population there is not vary by gender or age associated between IFG and type 2 Diabetes and traditional risk factors and Utumatwishima et al. (2018) mention in their study that prevalence of T2DM is higher among African men but precise percentage about the differences between women and men is uncertain.

## 5.2 Healthy lifestyles

Issaka et al. (2022), Augustin et al. (2017) and Issaka et al. (2018) bring out in their studies that the burden of type 2 Diabetes is progressively increasing among the African population, and it has been attributed to a fast increase in urbanization and food market globalization which are associated with changes in traditional lifestyle risk factors. Many of chronic diseases are related directly to nutrition transition which is promoted and accelerated by globalization and urbanization.

Due urbanization, people are changing more sedentary and changing to western-style diet which include more animal products, refined grains, salt, fat and sugar and less fibers and consequences of that is chronic diseases which are becoming one of the main burdens to the disease, mortality, and disability. Risk factors of type 2 diabetes include unhealthy diet, tobacco, alcohol, physical inactivity, and obesity. Urbanization in Africa have its own associations to increased amount of type 2 Diabetes. Interestingly, Issaka et al. (2022) and Goedecke et al. (2017) mention that nearly 70% of West African women have never drunk alcohol, because of the religious and cultural factors and women in Sub-Saharan African does have a higher burden for risk factors for type 2 Diabetes than men, in particular obesity and it

can be partly explained by sociocultural factors, such as work activities which are gender-specific and lifestyle which is sedentary.

There has been a significant finding that people who have a higher socioeconomical status have a higher risk to develop diabetes. The groups who had higher socioeconomic status had more harmful behavioral such as consumption of alcohol, unhealthy diets (consuming more fats, salt, and processed foods), and higher physical inactivity. Non-communicable disease does have disproportionately effect on people's lives in low- and lower-middle-income countries. The association between non-communicable diseases, poverty and social and economic development and the poor may be more vulnerable to develop non-communicable diseases for many reasons like material deprivation, psychosocial stress, higher levels of risk behavior, living conditions which are unhealthy, limited access to health care and reduced opportunities to prevent complications. People who have a low socio-economic status are more likely to use more tobacco, have unhealthy food, be more physically inactive, and overweight or obese. There seems to be some also some associations between lower education and diabetes as well. (Williams, Allen, Wickramasinghe, Mikkelsen & Roberts 2018.)

Gissing et al. (2017) and Kadari et al. (2021) point out that foods which are rich in saturated fat and sugar and that combined with lower levels of physical activity and sedentary lifestyle does lead to a rise in overweight, obesity and type 2 Diabetes and over consuming energy-dense food and a sedentary lifestyle together are playing a main role in causing the abdominal obesity. Hirut et al. (2020) and Frank et al. (2014) have found in their studies that there are commonly two dietary patterns in Africa: (1) a 'purchase' dietary pattern and (2) a 'traditional' dietary pattern. T2DM associates inversely with the traditional dietary patterns. Urbanization have caused those traditional dietary patterns to have also changed to more high carbohydrate consumption. Associations between dietary patterns and type 2 diabetes is evident.

There have been identified two dietary patterns specifically in sub-Saharan Africa: (1) a 'purchase' dietary which correlated positively with usage of sweets, meat, rice, fruits, and vegetables and (2) a 'traditional' dietary pattern which correlated with the usage of fruits, green leafy vegetables, fish, plantain, palm oil and fermented maize products. Younger and skinnier people and people with higher socio-economic status were more often having the 'purchase' dietary pattern and people who had the 'traditional' dietary pattern were often older, bigger, and more deprived. These both dietary patterns were associated with type 2 Diabetes. Often people who were above the average level of income and who had a better food knowledge were having a 'purchase' dietary pattern and people with low income and poor education level had the 'traditional' dietary pattern. West African people consume in increasing level dietary energy, fat, sugar and protein and less fruit and vegetables. Generally, the foods consumed is majorly traditional but in major cities, children consume

more often energy-dense foods like candies, ice cream and sweetened beverages than fruits and vegetables. Food insecurity often cause that there is less intake of fruit and vegetables, meals are skipped, of portion sizes are reduced, and over consumption of foods which are high in calories but lacking in nutritional value. (Bosu et al. 2015; Nkambule et al. 2021.)

Previously, the main source of transportation was walking but currently more people are using other forms of transportation which is leading into decreased physical exercise levels. In rural areas people have higher physical activity which is protecting people from cardiometabolic risk factors compared to more urban areas where people have more sedentary lifestyle and appearance of these risk factors is more common. (Hirut et al 2020; Augustin et al. 2017.)

Goedecke et al (2017), Kadari et al (2021), Frank et al. (2014) and Hirut et al. (2020) mention in their studies that the main limitations to manage type 2 Diabetes seem to be cultural perceptions related to weight loss like that women are more attractive when they are obese and limited financial resources and often in SSA, abdominal obesity is considered as a sign of wealth, affluence, dignity, and respect. Obesity is often connected to affluence, health, and beauty among SSA women. Determinants of choices of food are most often influenced by convenience, price, and availability and not with by social desirability and changing the cultural diet and the eating habits is difficult. Because of the virtue of the pivotal role in the family's structure in Africa, women are often involved in the managing of family members type 2 Diabetes, because of their capacity as mother or partner. Yuiga et al. (2020) note that sedentary lifestyle and dietary patterns are the main modifiable risk factors of overweight and obesity. Important determinants on dietary behavior are convenience, social network, finances, gaps on food skills and knowledge, food deserts and culture. Cultural beliefs are for example, strong connection between high social status and overweight, energy-dense confectionery, salty and fatty foods. Sedentary lifestyle is influenced by changing transport habits and cultural beliefs which can cause unfavorable gender stereotypes.

### 5.3 Recommended interventions

Findings does suggest that awareness of the health effects of overweight and its role in raising risk of type 2 Diabetes is clearly still lacking in Sub-Saharan Africa and prevention work for type 2 Diabetes is vital especially for women in SSA countries. Food insecurity need to be integrated into diet sensitive non-communicable diseases prevention programmes. Due the fact that these risk factors are more common among women, the need for more prioritized resources and interventions with gender-specific effect. (Goedecke et al. 2017; Nkambule et al. 2021.)

Mudie et al. (2019) and Bosu et al. (2015) mention that with further studies, resources and more data, there will be possibility to introduce effective measures which would reduce the

burden of NCDs in Sub-Saharan Africa and governments, partners, private sectors, and civil society need to upgrade the health systems and build capacity which can address the dual burden of malnutrition, to regulate the industry of food and beverages and to encourage people to have a healthy diet. Dietary habits are often difficult to change and especially in West African countries where the habits are influenced also by sociocultural beliefs. Gissing et al. (2017) point out that there is some research which focus on various factors which are driving obesity in Africa but most of the available research is from high-income countries, and therefore it would be important to conduct more research about specific determinants of dietary behavior which would guide into culturally appropriate and more effective interventions.

There is need for effective development strategies which would reduce the overall burden of non-communicable diseases without increasing health inequalities. There is important also to set up a national-level surveillance systems which would examine more the relationship between non-communicable diseases and socioeconomic status. (Williams et al. 2018.) Unfortunately, the second biggest city, Bobo-Dioulasso in Burkina Faso, is not prepared to face these public health issues and there is an urgent need for responses to reduce the health risks which are associated with urbanization (Augustin et al. 2017). Even the increasing burden of type 2 Diabetes is evident, Africa won't have enough resources and infrastructure to deal with the diabetes among other existing communicable diseases (Issaka et al. 2018).

The main point in Type 2 Diabetes management and prevention is to promote lifestyle interventions which include healthy diet, physical activity, which is regular, decreasing smoking, and keeping healthy body weight **(**Hirut et al. 2020). World health organization's response to the rising burden of type 2 Diabetes does include global prevention strategies which are focusing on behaviors and social determinants which could be modified through creating environments which are healthier (Gissing et al. 2017). Public health intervention strategies and policies for preventing type 2 Diabetes and IFG in West Africa, should target adult population from any age or sex. Considering the challenges to implement weight management strategies based on the harmful perception of abdominal obesity among the people of SSA, and the mediating role of abdominal obesity in developing type 2 diabetes and other chronic diseases, there is very urgent need for strategies which raise the awareness regarding the health implications of abdominal obesity. (Issaka et al. 2022; Kadari et al. 2021.) There is high need for extensive skill-based interventions which are focusing on socio-cultural misconceptions and financial limitations (Yiga et al. 2020).

The burden of non-communicable diseases like type 2 Diabetes is rapidly rising in low- and middle-income countries. People who live in low-income communities and have type 2 Diabetes are facing unique challenged like lack of awareness and difficulties to access proper health care and medications, and due these challenges, people failure to achieve optimal

diabetes management and preventing complications. Intervention programs which aim for lifestyle modifications by adding to the program diet, physical activity, and health behaviors, have been shown to decrease the type 2 Diabetes occurrence among high-risk populations. It is important to notify that interpreting evidence straight from high-income countries to low- and middle-income countries is not appropriate, because it need to be considered that there are a significant economic and cultural differences among targeted populations.

Community-based interventions are good in modifying several risk factors for type 2 Diabetes, such as weight, BMI, waist circumference and glycemic control indices. With effective models for Diabetes prevention and care could help to reduce the increasing burden by standardizing a proper guideline for prevention and management work, it would improve access to care, engage communities and peers, and it would improve the training of professionals and patients. (Karachaliou, Simatos & Simatou 2020.)

There is need to transmit information about the healthy diet like for example, benefits about the traditional food, which is often high in whole grains and fiber and about the dangers of sugar sweetened drinks and sugars. Also, the need for the education about how to reduce non-communicable diseases and the complications, for example, with decreasing protein intake it is possible to protect renal function, with proper foot care is possible to reduce the risk of amputations and lowering the glycemic and having the cardiovascular benefits with physical activity. Customized lifestyle interventions could possibly achieve both secondary and primary prevention of T2DM, but these interventions require strategies which are innovative and sensitive to the diversity of the population of African descent. Creating an effective prevention intervention of T2DM will require a proper understanding of the local culture, history, economic and metabolic factors which have own impact on diagnosis and treatment of T2DM. (Utumatwishima et al. 2018.)

Type 2 Diabetes requires lifelong lifestyle interventions and pharmacological therapy in African descent. Regular physical exercise, management of weight and healthy diet are the main parts in lifestyle interventions and in the prevention and management of type 2 Diabetes in Africa. The main factors for poor adherence were both systemic (poor access, population changes, influence of Western culture, and not quality healthcare) and personal (educational level, poverty and cost and perceptions) in nature. To overcome these barriers, it is needed to strategies which include a proper advocacy, health education program, and building the capacity. In African countries it is important to create awareness among people with T2DM and implement new intervention prevention programs because the treatment of T2DM is creating an economic burden to the already weak economy. (Hirut et al. 2020.)

# 6 Type 2 Diabetes intervention workshop

## 6.1 Type 2 Diabetes intervention workshop material

The intervention material and the workshop framework will be investigated in this chapter. The whole material for the workshop was emphasized on counseling on general level about type 2 Diabetes prevention for the women in Burkina Faso and to being able to help, you must know and understand people, and when helping people, it is important to understand their lifestyle, beliefs, and customs. Culture does also have a big impact on individuals' behavior, such as beliefs, values, language, and family influence.

The workshop material was designed for this study based on a literature review and the material were designed to cover different themes which occurred on the literature research about type 2 Diabetes prevention. These themes were type 2 Diabetes, Type 2 Diabetes in Burkina Faso and Type 2 Diabetes prevention which included sub themes about healthy lifestyles. More specifically, the workshop material about type 2 Diabetes included the general information about type 2 Diabetes and why it is important to prevent it especially in Burkina Faso and the material is presented in Appendix 4. The information about healthy lifestyle included details about general recommendations of healthy diet, exercise, effect of tobacco using and alcohol consumption, and sleeping. Healthy diet included information about general recommendations about drinks and alcohol consumption, carbohydrates, fibers, proteins, fat, salt, vegetables, fruits, and snacks. The part about exercise included general recommendations and information about what kind of exercises is recommended and how long, how heavy, and how often is recommended to practice those exercises. These recommendations were considered in culturally sensitive way which were shown already in the material, in which were considered the ingredients and food what local people use and can use and in the similar way the exercise recommendations were considered in the way that women in Burkina Faso can really practice those exercises with an easy access.

The Adamadeya ry suggested that into prevention material there would be included picture cards which would possibly support the message of the education which will be provided to the people who might have a low education level and for example, are not able to read. Visual learning like using pictures and photos is a very good way to receive information as well as provide a proper education. When teaching about for example, food choices, it is always good to be able to show the examples by using real models, labels, and food samples. This is why the workshop material included picture cards which supported the verbal and literature material. These picture cards are presented in Appendix 3 and the cards includes pictures of different exercise suggestions which were mentioned as an examples and pictures about different ingredients for the healthy diet, for the local women in Burkina Faso.

## 6.2 Type 2 Diabetes prevention workshop

The type 2 Diabetes prevention workshop was tested with the smaller attendant group from who was collected feedback about the workshop. Attendants on the test group were all women who were over 18-year-old which is considered as a minimum age limit for adult participants on this workshop. On the testing group were 25 participants who were informed about the workshop and the thesis in advance and before the workshop started. There was not any previous knowledge about the participants personal data or about their education level or knowledge about type 2 Diabetes prevention.

The workshop was conducted by worker from Adamadeya ry, who also collected all the verbal feedback from the participants. The participants were asked to tell their opinions about the effectivity of the workshop and any development suggestions about the workshop. The local worker collected all the feedback anonymously by writing the comments on the paper and providing the feedback to the author without revealing the workshop participants identities.

Participants experienced that the workshop was effective, and the experience was positive. Participants also experienced that they received good acquirements, and they learned a lot of new information which they would like to adapt into their normal life in the future.

> We are committed from now on to relay on shared information about healthy lifestyles and through that to avoid diseases caused by poor diet, such as type 2 Diabetes.
>
> I promise to change my lifestyle habits after this.

Also, many participants brought up that they wish to participate again to the workshop and invite more people into it, because they believed that the information in the workshop was important, and it should be shared among other women.

> We wish to attend to another workshop session about type 2 Diabetes prevention.

Some of the participants hoped to learn more details about the ways how to improve their health and prevent type 2 Diabetes.

> I would like to learn more about specific ways to practice different exercises so I could help other women to be active in their life.

It can be detected from the received feedback that participants experience of the workshop was generally positive and there were not any development suggestions which they would have brought up. This verbal feedback which was received from the participants led into conclusion that the workshop material is working for the female audience in Burkina Faso, and it was handed over to the Adamadeya ry staff as it was.

> Participating to the type 2 Diabetes prevention workshop was satisfaction.
>
> We are very happy that we received information about negative effects of an unbalanced diet.

According to the feedback and based on the authors analyze about the feedback, the adjustments for the teaching program were not needed. The workshop material was handed over to Adamadeya ry and the results were published on Theseus.

# 7 Discussion

This study aimed to produce a prevention program material which includes picture teaching cards, to support the education program, to women in Moami village in Burkina Faso, and in the light of the participant feedback, it did succeed in that.

The objectives included studying previous research about type 2 Diabetes and how to prevent it, about type 2 Diabetes in Sub-Saharan African countries. These goals were met in the literature research. The literature review results pointed out the need for the health promotion in Burkina Faso as Mudie et al. (2019) and Yiga et al. (2022) mentioned in their studies that non-communicable diseases have a large and growing impact to burden of death and disability in sub-Saharan Africa and these non-communicable diseases which is lifestyle-related, cause nearly half of all deaths and disabilities in low- and middle-income countries. Also, Goedecke et al. (2017) and Issaka et al. (2018) pointed out in their studies that in Sub-Saharan Africa, little below 70% of the population are unaware of type 2 Diabetes possible complications, but they are also unable to access to the correct education and health services.

The decision to choose women as the target group was based on the studies where Gissing et al. (2017), Kadari et al. (2021), Yiga et al. (2020), Nkambule et al. (2021), Augustin et al. (2017) and Goedecke et al. (2017) mentioned that prevalence of obesity/overweight is higher among women in Africa, and it is almost twice as high as in men but prevalence of type 2 Diabetes does not differ by gender but deaths which are attributed to type 2 Diabetes are greater in women, probably due to access to care and differences in beliefs. Women also have strong influence on possible life changes in family as Goedecke et al. (2017), Kadari et al. (2021), Frank et al. (2014) and Hirut et al. (2020) mentioned in their studies that women often have a pivotal role in the family's structure in Africa and women are often involved in the managing of family members type 2 Diabetes, because of their capacity as mother or partner.

There is multiply factors which cause the increasing levels of type 2 Diabetes in Burkina Faso and Utumatwishima et al. (2018), Goedecke et al. (2017) and Issaka et al. (2018) point out

that the increasing prevalence of T2DM is commonly attributed to urbanization, which cause unhealthy food habits, sedentary lifestyle and increasing rates of overweight and obesity. Based on this literature review and knowledge collected out of it, the objective to create a prevention intervention material, about type 2 Diabetes prevention, for the health education workshop was met, as well as creating a tested workshop material to share with Adamadeya ry.

The studies in literature review generally brought up the future need of health prevention programs which focus is on prevention of type 2 Diabetes and as Goedecke et al. (2017), Nkambule et al. (2021) and Hirut et al. (2020) pointed out that prevention work for type 2 Diabetes is vital especially for women in SSA countries and food insecurity need to be integrated into diet sensitive non-communicable diseases prevention programs and in this intervention was emphasized the main point in Type 2 Diabetes management and prevention which is to promote lifestyle interventions which include healthy diet, physical activity, which is regular, decreasing smoking, and keeping healthy body weight. Also, this intervention emphasized raising the awareness regarding the abdominal obesity implications to health as Issaka et al. (2022) and Kadari et al. (2021) mentioned that there is a lot of challenges to implement weight management strategies based on the harmful perception of abdominal obesity among the people of SSA.

Utumatwishima et al. (2018), Gissing et al. (2017) and Karachaliou et al. (2020) mentioned in their studies that most of the previous studies and health promotion programs to prevent type 2 Diabetes is from high-income countries and that is why the intervention emphasized the importance to consider that there are a significant economic and cultural differences among targeted populations and creating an effective prevention intervention of T2DM will require a proper understanding of the local culture, history, economic and metabolic factors.

The material for the workshop was carefully planned and information was kept simple because there were many factors which needed to be considered when conducting such a workshop for women in Burkina Faso. For example, Issaka et al. (2022), Augustin et al. (2017) and Issaka et al. (2018) bring out in their studies that people in Burkina Faso are changing their dietary habits into diet which include more animal products, refined grains, salt, fat and sugar and less fibers and this had to be considered when creating the workshop material.

Picture cards were selected carefully with the idea that those included pictures about exercises and nutrition what local people can use and do, also this supported passing the information to people who might not know how to read or write, or the education level is not that high, this needed to be considered also in the material for the workshop as Williams et al. (2018) mentioned in their studies that there seems to be also some associations between lower education and diabetes as well. Acknowledging importance that it was needed to

consider the fact that participant used multiply different languages, so translating the material from English to French was not enough and the staff member had to interpreter the material to Dioula as well.

Understanding the cultural impact to the eating habits and behavior, which might have strong impact to the high level of type 2 Diabetes in Burkina Faso, is important like Goedecke et al (2017), Kadari et al (2021), Frank et al. (2014) and Hirut et al. (2020) mention in their studies that the main limitations to manage type 2 Diabetes seem to be cultural perceptions related to weight loss like that women are more attractive when they are obese and limited financial resources and often in SSA, abdominal obesity is considered as a sign of wealth, affluence, dignity, and respect. The whole material for the workshop was emphasized on counseling on general level about type 2 Diabetes prevention for the women in Burkina Faso and it was part of the thesis as a whole.

## 7.1 Reliability and validity

The basis of good research does enable that the author can define the research question, collect the desired information, and implement appropriate procedures in analyzing, recording, and publishing the results of the research in careful and systematic manner (European Code of Conduct for Research Integrity 2017). The European Code of conduct for Research Integrity (2017) guided during this study the author in ensuring and ethical, authentic, and practical study, in collaboration with the Adamadeya ry and Laurea University of Applied sciences thesis supervisor.

According to Efron and Ravid (2018), using of relevant articles in literature review aid in the understanding of the importance and contribution of the study and this is why the recent and relevant research articles which were used, ensured the credibility. The research process, methodology, findings, and conclusions were explained clearly and written down systematically. The credibility during the study process was ensured with having regular video meetings with the thesis supervisor and with the Adamadeya ry project mentor. (Efron & Ravid 2018.)

Like all reviewers, the author was limited to what is reported. As previous studies about the subject were very limited, this required an extensive search for literature research. It is noteworthy that previous studies about the subject of the study were very limited specifically studies about already conducted, type 2 Diabetes prevention programs in Burkina Faso or in Sub-Saharan Africa. This led to the strength of this study, that the included studies were high quality and those were assessed carefully and appropriately. (Higgins & Thomas 2022.)

The process of the study lasted approximately one year, and it was defined and clearly written down to ensure dependability. Clear reasons for all the selections and decisions were

noted in writing. To ensure confirmability, justifications for methodology, findings and conclusions were provided. According to Efron and Ravid (2018) taking notes is an important part of the process as notes interpret and summarize relevant issues and it reflects their meaning for the study process.

In this study there were only one author which can decrease the interrater reliability and increase the possibility of error in research (Grove et al. 2015, 289-290). Literature research data were analyzed in two different occasions, to avoid research error. Author and workshop holder assure that the workshop was carried through consistently according to a material, to avoid inconsistency and this increases the reliability. (Grove et al. 2015, 226.)

According to Logan & Siegel (2017) when prevention programs are based on reliable evidence, theoretically, focusing on prevention is more cost effective and over time when successful prevention program continues to reach more people, the benefits is that it can as well, help people to live healthier lives. The initial workshop material was made by the author and the intention was to create something original. The material was based on the literature research data. The first edition of workshop material was given to Adamadeya ry staff before the workshop, and based on the feedback, the material was not needing update or developing at this point. The staff of Adamadeya ry performed the workshop in one location and it was held outside in open air, and it was open to everyone to access.

## 7.2 Ethical and legal consideration

Throughout the study, when literature review was reported, the researcher cited references carefully and appropriately, to respect other researchers and their work.

This study does follow the guidelines, published by TENK in 2019, of Ethical principles of research with human participants and ethical review in the human sciences in Finland. These guidelines do cover all scientific research which involves human participants or research methods which are used in human sciences which includes fields like arts, technology, natural science, medicine, and non-invasive health. (TENK 2019, 50.) For this study there was no need to apply a research permit since the author were not in any straight contact to the participants and the questionnaire used was from its nature like feedback of the workshop generally and the feedback was given to the staff member of Adamadeya ry who was running the workshop. Eighter, the statement from the ethical board was not required for this study. (TENK 2019, 50.)

In early of the research process the plan for the communication and publication were prepared as a part of proper scientific practice. With a proper planning can prevent confusion about authorship and it can help to find ways to communicate the results in a way which will stand out from other research publications. (Ala-Nikkola & Rekola 2020.) Agreement for the

team was written and signed by all parties of the study, including Adamadeya ry and author. This agreement includes explanation of each partners responsibilities, plan of the communication methods and about publication of the study. Adamadeya ry responsibilities were to recruit participants, organize equipment's for the workshop and making sure that legal and ethical permits will be on order from the Burkina Faso point of view. The author conducted the material for the prevention workshop and passed the knowledge to the Adamadeya ry staff through the provided material, who then held the workshop. The cost of the material for the workshop were covered by author. The author covered the cost of water for the participants and rental seats for the workshop.

According to guidelines of TENK, the participants have received in advance all the information about the nature of the study as much as about workshop and feedback survey and how the feedback and results will be handled and used in the future, the information were explained to participants in a manner that they all were able to understand. (TENK 2019, 53.) All the participants were able to discontinue the workshop, as well as ask any further information concerning the study, at any time. Participation in the workshop should not harm the participant in any form or way (TENK 2019, 50-51).

To make sure that the anonymity of the participants was saved and because it was not needed in this study the author did not need to submit any personal data register. All the participants remained anonyme and all the answers for the feedback kept the anonymity of participants. Instead of that, the author did notify participants beforehand about the nature of the workshop and explained the participation in the verbal feedback survey. According to the collaboration partner Adamadeya ry organization has already the Burkina Faso government's permission to operate in Burkina Faso, so Adamadeya ry did not need any separate permission to participate in or carry out interventions such as in this study.

Responsible Research (2018) does notify that a research publication's will not be alone the scientific community. Researchers need to be able to communicate with the academic world but also with the research aims and objectives as well as the methodology, data analyses and research results in the way that that several different audiences find it clear. Author had to familiarize with an ethical understanding and the guideline for research integrity. Researcher is always held accountable for understanding responsibilities of practice, ethical principles, signs of violation, RCR guidelines and the possible consequences of fraud, as well as understanding all the steps and procedures which are part of the ethical evaluation.

During the study there were not collected any sensitive information or data which would have needed data protection. (ARENE 2018, 4.) The good research practice includes always following the material, method, result, and guidelines of the publication while conducting any research, researchers should also always follow the copyright act and give accordingly the

recognition, while referring to the origin at the same time respecting the copyright legislation. Throughout this study, guidelines of ARENE, regarding to the materials, methods, results, and outcomes in relation to the model of open science and research have been followed accordingly. (ARENE 2018, 9-10.)

Personal data is defined as any kind of information which is related to an identified or identifiable person and this kind of information could be such as a name, and identification number, online identifier, or location or specific information about data subject's physical, physiological, genetic, economic, mental, cultural, or social identity. (European Union 2016.) Any personal information was not collected through this study.

Unfortunately, the author was not able to travel to Burkina Faso as originally planned due the unsafe situation around Burkina Faso, therefore the plan had to be modified to way that author familiarized the Adamadeya ry staff to hold the workshop in Burkina Faso. The author and Adamadeya ry staff had no previous connection to the participants participating in the workshop which partly helped to improve and secure the reliability on part that participants anonymity was secured. The participants were informed verbally about the workshop in advance because the written participants information sheet would not have brought any extra validation based on the fact that most of the participants would not be able to read it due the reading problems and language problems among local women. (Kuula-Luumi 2022.)

There is always a small possibility of reliability participant error that participants not fully understanding all the information shared during the workshop due the possible language barrier. Because of the fact that in Burkina Faso many of the adults does not know how to read or write or they simply don't understand the language, which is spoken in the workshop, the material has kept simple, the English material have been translated to Burkina Faso's official language French and it was translated verbally to Dioula language, which is widely spoken and understood in Burkina Faso, by the Adamadeya ry staff member who was holding the workshop.

Due the fact that the author was not able to participate in the data collection in Burkina Faso and due that had no evidence if participants had the change to decline from the feedback survey or workshop or if the participants were adult women. Nevertheless, author had a highly trustworthy relationship and very good communication with Adamadeya ry in the belief that holders of workshop did work ethically and aligned on what had been agreed. (TENK 2019, 8-15.) In the future in similar situations, where the author is not able to travel to the destination country, it is important to have a trustworthy and fluently working communication with local organization, to secure that the process is conducted by following ethical and legal regulations.

The results of the study will be published on Theseus. The content of the publication does include reporting the review about type 2 Diabetes prevention, creation, and conducting of the type 2 Diabetes health prevention workshop. The target group for the publication are other students at Laurea University of Applied Sciences, the staff at Adamadeya ry, and the scientific community in health education. The copyright of the content of the workhop framework, study data and reporting does belong to the author. The project was financed by the author.

# 8 Conclusions

This study investigated how to prevent type 2 Diabetes in Sub-Saharan African countries and the result of the investigation was produced as a workshop material. The test workshop was carried out one time in January 2023 in Moami and consisted of workshop was created by author. Melnyk & Morrison-Beedy (2012, 3) tell that the significance, impact, and innovation are parts of intervention study, and those will help to figure out which interventions will work, and which one will not. This study provided impact which are the study results which will offer increased knowledge in type 2 diabetes preventions to be used in the global infection prevention and health education field. The study provided the product which is the workshop material for type 2 Diabetes prevention, and it will help future health educators to teach their global audience about type 2 Diabetes, in innovative and tested way. This study does show that the participants of the workshop did feel the intervention as a positive thing and that they received new and important information, this make it significant in a way it was intended to be.

This study focused on a type 2 Diabetes prevention in Sub-Saharan African countries. The results of this study were showing that there is a lot of information about subject and many interventions is tested and studied but not that much in Sub-Saharan Africa, where the need is highest. There has not previous studies about type 2 Diabetes prevention programs in SSA countries, where picture cards would have been part of the education program. The author reviewed a large amount of background information for the literature research and workshop content to make sure that it was accurate and reliable. Cultural issues were considered in different levels by considering the material information and picture cards used in the way that it was locally appropriate, and the workshop was held by local coordinator. The author did not interference the workshop, so the Adamadeya ry staff had the freedom to run the workshop the way they saw the best.

Considering the ethical side, the author had no evidence if participants had the possibility to decline from the research or if the participants really were over 18 years old, as agreed. There is always a small likelihood of participant error in reliability, that feedback was given

or modified by the staff and not the participants when participants not fully understanding all the questions. There is no reason to assume such behavior or other behavior bias such as changing the feedback answers afterwards, since the author had a trustworthy relationship and well working communication with Adamadeya ry and author is in strong belief that workshop holder worked ethically and aligned on what had been agreed.

Grove et al. (2015, 83) mention that open ended questions may help to gain new insight on the research as participants are encouraged to raise issued and observations the author might have not noticed themselves. Open end questions were a great way to collect relevant information about participants overall experience on the workshop. The workshop material was conducted in health prevention program, where 25 participants attended to the intervention and gave the feedback about the overall experience. Giving to the participants the possibility to provide feedback openly, could enable direct feedback which can make the future development ideas more visible.

After handing over the workshop material, the author, and the workshop team from Adamadeya ry met to have a reflective discussion and possibility to evaluate the overall workshop and its outcomes, and through that to discover possible future development ideas and innovations. The team who conducted the workshop thought that the material was clear and easy to perform and the communication between the two parties was fluent and easy. Author is more than happy to pass on the workshop material and collected data for the future development research. The author suggests that in the future, the workshop outcomes will be tested with other, perhaps qualitative study methods.

The ongoing terrorist situation in Burkina Faso had a huge impact on the schedule and execution of the project. The original plan was to carry out the workshop in August 2022, with author traveling to Burkina Faso but due the restrictions and unsafe situation, this was not possible to conduct. These issues have their own impact to the progress of the study, but were overcome through cooperation, and using online connection tools.

# 9 Recommendations

Health care providers should engage in a proactive role in the prevention of type 2 Diabetes as well as provision of support, a proper guidance and accurate information for women in Burkina Faso. Further trainings on type 2 Diabetes prevention as well as clinical needs are necessary. The ways to provide information in effective way and how to support people on preventing type 2 Diabetes in Burkina Faso, should be developed. A culturally sensitive approach should be addressed in the prevention material more widely.

To prevent Type 2 Diabetes will require comprehensive actions in whole society and tailored prevention programs to the people who have evidentially higher risk to develop Type 2 Diabetes. Collaboration will be needed inside of health care factor but also between the different actors of the society. In many countries have been proved that prevention programs can achieve good results also in normal health care level.

Furthermore, conducting such a small study may not show the true impact of the type of workshop used even the results of the workshop feedback were promising. It would be beneficial to carry out a follow-up study where the long-term results could be revealed because now it remains hidden. Perhaps the study should be carried out several times or study the same participant group again to reveal the possible long-term effects. This thesis was a small-scale study, however hopefully it will inspire larger research on the topic.

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Tables

Appendices

Appendix 1: Included studies which have been systematically searched.

| *Author(s), Title of the study and year* | *Purpose of study* | *Sample and setting and Study design* | *Findings* |
|---|---|---|---|
| *Goedecke, J., Mtintsilana, A., Dlamini S. & Kengne A.*<br><br>*Type 2 diabetes mellitus in African women.*<br><br>*2016.* | The impact of T2D on women in SSA. | Women from Sub-Saharan Africa (SSA).<br><br>A systematic literature review. No intervention. | Diabetes-attributed mortality in SSA is higher in women than men.<br><br>Women has greater risk factor burden, obesity, socio-cultural beliefs, lifestyle factors, and access to care. |
| *Frank, L. Kröger, J., Schulze, M., Bedu-Addo, G. & Mockehaupt, F.*<br><br>*Dietary patterns in urban Ghana and risk of type 2 diabetes.*<br><br>*2014.* | Identifying dietary patterns and their associations with type 2 diabetes in an urban Ghanaian population. | Urban Ghanaian population.<br><br>A hospital-based case-control study. | Two diverse dietary patterns were identified and associated with type 2 diabetes in urban Ghana. |
| *Bosu, W.*<br><br>*An overview of the nutrition transition in west Africa: implications for non-communicable diseases.*<br><br>*2014.* | What kind of different diet practices is in West Africa and how those can have negative effects such as obesity, hypertension, and diabetes. | West Africa.<br><br>Systematic literature review. | The consequences of nutrition transition are not only being felt by the persons in the high socioeconomic class, but also of adults from the poorest households. |
| *Utumatwishima, J., Chung, S., Bentley, A., Udahogora M., & Sumner, A.*<br><br>*Reversing the tide – diagnosis and prevention of T2DM in populations of African descent.*<br><br>*2018.* | Could customized lifestyle interventions achieve both secondary and primary prevention of T2DM among African and Caribbean populations. | African, Caribbean and African-American population.<br><br>Literature review. | With proper treatment and patient education, many complications of T2DM can be avoided or mitigated.<br><br>Diagnosis and prevention of T2DM requires innovative strategies that are sensitive to the diversity that exists within populations of African descent. |
| *Augustin, N., Marceline, T., Tougouma, S., Kassie, D. & Fournet, F.*<br><br>*Can urbanization, social and spatial disparities help to understand the rise of cardiometabolic risk factor in Bobo-Dioulasso? A study in a* | Investigating the occurrence of cardiometabolic risk factors in different urban settings within Bobo-Dioulasso and to analyze their spatial distribution in relation with the socio-demographic characteristics. | Population of West Africa, Burkina Faso, Bobo-Dioulasso.<br><br>Cross-sectional study. | The results show that in a developing country like Burkina Faso and even in secondary cities, such as Bobo-Dioulasso, chronic diseases are a health issue that is growing rapidly. |

| | | | |
|---|---|---|---|
| *secondary city of Burkina Faso, West Africa.*<br><br>*2017.* | | | |
| *Gissing, S., Pradeilles, R., Osei-Kwasi, H., Cohen, E. & Holdsworth, M.*<br><br>*Drivers of dietary behaviours in women living in urban Africa: a systematic mapping review.*<br><br>*2017.* | To determine the factors influencing diet and dietary behavior in women living in urban Africa. | African women aged 18-70 years from urban Africa.<br><br>Systematic mapping review. | Determinants significantly associated with unhealthy dietary behavior ranged from the individual to macro level. |
| *Williams, J., Allen, L., Wickramasinghe, K, Mikkelsen, B. & Roberts, N.*<br><br>*A systematic review of associations between non-communicable diseases and socioeconomic status within low- and lower-middle-income countries.*<br><br>*2018.* | Mapping the literature on evidence from LLMICs on the socio-economic status (SES) gradient of cardiovascular disease, cancer, diabetes, and chronic respiratory diseases. | General populations (different income levels) from low- and lower middle-income countries.<br><br>A systematic review. | Development programmes must consider health alongside other aims and NCD prevention interventions must target all members of the population. |
| *Issaka, A., Paradies, Y. & Stevenson, C.*<br><br>*Modifiable and emerging risk factors for type 2 diabetes in Africa*<br><br>*2018.* | This study will examine the modifiable and emerging risk factors associated with T2DM in Africa. | Africa.<br><br>A systematic review and meta-analysis. | This study add to the extant literature by synthesizing the evidence on the association between modifiable risk factors and T2DM in Africa and provides a reliable evidence base for policy makers and future research. |
| *Mudie, K., Jin, M., Tan, Kendall, L. & Addo, J.*<br><br>*Non-communicable diseases in sub-Saharan Africa: a scoping review of large cohort studies.*<br><br>*2019.* | Identifying the level of research output on NCDs and their risk factors collected by cohorts in SSA. | Sub-Saharan Africa.<br><br>A scoping review. | Hypertension was most commonly reported, followed by obesity, diabetes, CKD, COPS, cervical cancer, and breast cancer. The majority reported data on at least one demographic/environmental, lifestyle, or physiological risk factor but these data varied greatly. |
| *Yiga, P., Seghers, J., Ogwok, P. & Matthys, C.*<br><br>*Determinants of dietary and physical activity behaviours among women of reproductive age in urban sub-Saharan* | Factors influencing dietary and physical activity behaviors as risk factors for diet-related non-communicable diseases. | Women of reproductive age (18-49 years) living in urban sub-Saharan Africa.<br><br>A systematic review. | At the base of unhealthy dietary and PA behaviors are socio-cultural and environmental determinants which are not only intertwined conceptually but also vary with context. In SSA, these determinants are largely shaped by women. |

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| *Africa: a systematic review.*<br><br>*2020.* | | | |
| *Kadari C., Samadoulougou, S., Ouedraogo, M., Seni, K. & Fati, K-S.*<br><br>*Prevalence of abdominal obesity and its association with cardiovascular risk among the adult population in Burkina Faso: findings from nationwide cross-sectional study.*<br><br>*2021.* | Determining the prevalence of abdominal obesity, its predictors and its association with cardiovascular risk among adults in Burkina Faso. | Burkina Faso, adults of both sexes, aged between 25 and 64 years.<br><br>A secondary analysis of data from a national cross-sectional study, using WHO STEPwise approach. | The main predictors of abdominal obesity were being female, increased age, married status, high level of education and living in urban areas.<br><br>Strategies to reduce the burden of abdominal obesity and very high WC should be considered by Burkina Faso's policy-makers. |
| *Nkambule, S., Moodley, I., Kuupiel, D., Mashamba, T. & Tivani, P.*<br><br>*Association between food insecurity and key metabolic risk factors for diet-sensitive non-communicable diseases in Sub-Saharan Africa: a systematic review and meta-analysis.*<br><br>*2021.* | Determining the associations between food insecurity and key metabolic risk factors on the causal pathway to diet-sensitive NCDs and estimate the prevalence of key metabolic risk factors among the food-insecure patients in sub-Saharan Africa. | Sub-Saharan Africa.<br><br>Systematic review and meta-analysis. | The meta-analysis showed a significantly high pooled prevalence estimate of key metabolic risk factors among food-insecure participants. These metabolic risk factors were considerably more frequent in females than males. |
| *Issaka, A., Cameron, A., Paradies, Y., Bosu, W. & Yéssito, C.*<br><br>*Effect of age and sex on the associations between potential modifiable risk factors and both type 2 diabetes and impaired fasting glycaemia among West African adults.*<br><br>*2022.* | Is association between traditional risk factors and both diabetes and pre-diabetes, and whether these differ by age and sex, is important for designing targeted interventions. | People (men and women) aged 25–64 years, from 5 different West African countries. Burkina Faso, Benin, Mali, Liberia and Ghana.<br><br>Quantitative research. | Associations between traditional risk factors and both IFG and T2DM did not vary by age or sex among the West African population. Policies and public health intervention strategies for the prevention of T2DM and IFG should target adults of any age or sex in West Africa. |

Appendix 2: Included studies which have been manually searched.

| *Author(s), Title of the study and year* | *Purpose of study* | *Sample and setting and Study design* | *Findings* |
|---|---|---|---|
| *Karachaliou, F., Simatos, G. & Simatou, A.*<br><br>*The challenges in the development of diabetes prevetion and care models in low-income settings.*<br><br>*2020.* | To provide existing evidence relating to the effectiveness of these models in low-resource contexts, with the aim to highlight characteristics and strengths that make their implementation successful and long-lasting. | LMIC countries with the largest number of people with diabetes.<br><br>Literature review. | There is a critical window for the development and implementation of effective diabetes care models in low income settings. |
| *Bekele, H., Asefa, A., Getachef, B. & Belete, A.*<br><br>*Barriers and strategies to lifestyle and dietary pattern interventions for prevention and management of TYPE-2 Diabetes in Africa, systematic review.*<br><br>*2020.* | Reviewing articles that investigate lifestyle and dietary pattern interventions for diabetes prevention and management in Africa. Barriers to lifestyle interventions and strategies to overcome the barriers are also reviewed. | Diabetes in African countries.<br><br>Literature review. | Lifestyle interventions including regular physical exercise, weight management, and adherence to health care professionals' recommendations on a healthy diet are the cornerstone in the prevention and management of diabetes in Africa. The main barriers to adherence were both systemic and personal in nature. |
| *Yanogo, D., Sagna, Y., Tieno, H., Guira, H., Benon, L., Zida, S., Nikiema, P., Kabore, P., Tonde, A., Traore, R., Ouédraogo, D-D., Drabo, Y. & Sagna, Y.*<br><br>*Prevalence and associated risk factors of diabetes and impaired fasting glucose in urban population; A study from Burkina Faso.*<br><br>*2014.* | To give estimation of the prevalence of diabetes and IFG and investigate the associated factors with diabetes. | Burkina Faso, 467 people who were over 20 years old.<br><br>Cross-sectional study. | Overall prevalence of diabetes and IFG were 12,4% and 5,9% and the prevalence of unknown diabetes was 3.2%. Significantly associated with diabetes were gender, age, hypertension and BMI. |

Appendix 3: Teaching picture cards.

Appendix 4: Workshop material.

# How to prevent type 2 Diabetes

- Losing weight when having obesity is one way to prevent type 2 diabetes and eating a healthy.
- Balanced diet is great way to manage weight.
- Any amount of weight loss is already helping, even 1kg can already reduce the risk. (Diabetes UK 2022b.)
- Type 2 diabetes is possible to prevent by changing life habits. Lifestyle habits include:
  - losing weight more than 5%,
  - using fat moderately (less than 30% of whole energy),
  - saturated fat little (less than 10% of whole energy),
  - plenty of fiber (15g/1000kcal) and
  - exercise about 30min per day (4h per week) or more. (THL 2022.)