REPORT

How are citizens getting on at the Centre for Diabetes?

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Foreword

It is with great pleasure that we present the report How are citizens getting on at the Centre for Diabetes? The report summarises the results of an impact evaluation involving 300 Copenhagen residents with type 2 diabetes referred to a local-authority rehabilitation programme in the period from November 2018 to July 2019. The impact evaluation comprises questionnaire responses and physiological measurements collected at the start and end of the programme and at a six-month follow-up evaluation. The report describes and analyses the data generated.

Our aim in carrying out this study is to help document and publicise the local-authority element of the overall health effort to support people with type 2 diabetes. There is a lack of systematised data on the people being referred for local-authority rehabilitation, and on the effects and value they derive from the rehabilitation programme. This type of programme and this citizen group have not previously been the subject of systematic evaluation, and the study is the first of its kind in Denmark.

The Centre for Diabetes offers Copenhagen residents with type 2 diabetes support with managing everyday activities as they live with the condition and tackle its potential consequences. Successful diabetes management reduces the risk of the condition becoming worse and increases the possibility of preventing other chronic diseases. Our services take the citizen's needs and concerns as their starting point, based on an individual needs assessment. This means that there is no standard programme.

The results show that, in many respects, the Centre for Diabetes is succeeding in supporting citizens in living a good life with the condition. The results of the impact evaluation are being incorporated into our systematic work to develop and improve the quality of interventions so that citizens derive the greatest possible benefit from their rehabilitation programme. In respect of mental health, physical activity, physiological parameters, and coping skills, it is particularly evident that citizens are achieving good outcomes which are, in many cases, maintained beyond the end of the programme. In other areas, such as diet, smoking and alcohol, there is clearly a need to improve recruitment and the healthcare quality of the interventions.

We would like to express our gratitude to the citizens who took part in the study and made this report possible. Furthermore, we would like to thank the staff at the Centre for Diabetes who undertook the planning, data collection, analysis, and compilation of the results.

With this report, we hope to inspire other local authorities to strengthen their approach to data, documentation, and impact evaluation. We look forward to working closely with colleagues in other local authorities and other parts of the health service to strengthen the overall healthcare offering for people with diabetes and other chronic diseases.

We hope you enjoy reading the report.

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CENTER
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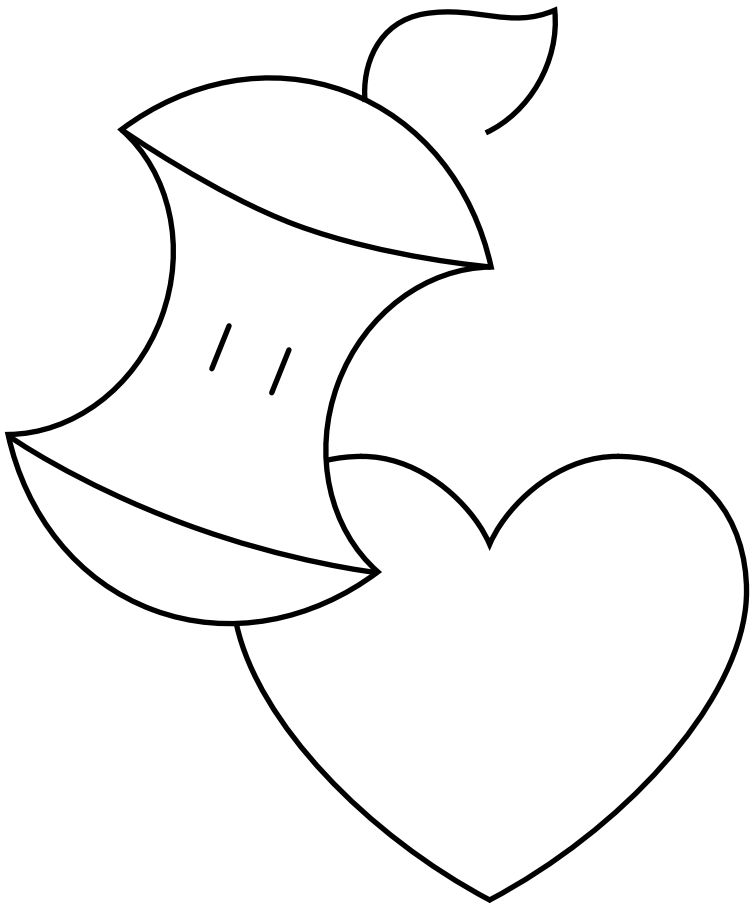
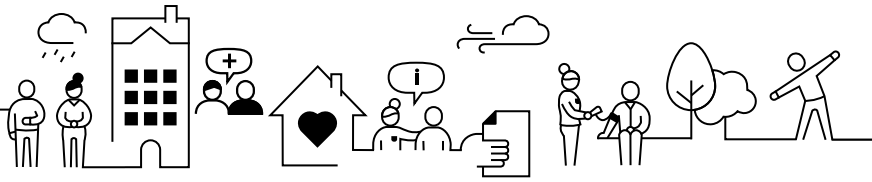


EXECUTIVE SUMMARY

Executive summary



The City of Copenhagen's Centre for Diabetes has carried out an impact evaluation involving citizens referred for local-authority rehabilitation in the period 2018–2019. The purpose of the impact evaluation was to describe the citizens undergoing rehabilitation at the centre and the benefits they derive from the programme. The impact evaluation was performed as a pre- and post-evaluation with no control group. Where possible, the results have been compared with other studies, in particular the Capital Region of Denmark's Health Profile 2017.

The data collection took place from 2018 to 2021 and was delayed in part by COVID-19, which resulted in longer programmes and probably increased drop-out. A total of 308 citizens took part in the impact evaluation.

Some of the results are subject to a high level of uncertainty due to the small number of citizens included in the analysis. It should be noted, however, that the general trend shows a positive development from the start of the rehabilitation programme to the end.

The key characteristics of the study population are described below, followed by a review of the main results of the study.

Demographics and social factors

The right citizens are being referred to the Centre for Diabetes

Compared with the City of Copenhagen's overall diabetes population:

- There is no difference in the distribution of sexes and level of education.
- The percentage of citizens in the 45–64 age group referred to the Centre for Diabetes is higher.
- The percentage of citizens with a non-western background referred to the Centre for Diabetes is significantly higher.

There is selection bias in respect of the citizens taking part in the impact evaluation

Compared with all citizens referred for rehabilitation at the Centre for Diabetes:

- The percentage of men taking part in the impact evaluation is higher.
- The percentage of citizens with long-cycle tertiary education taking part in the impact evaluation is higher.
- The percentage of citizens with a non-western background taking part in the impact evaluation is lower.

Course of disease and diabetes complications

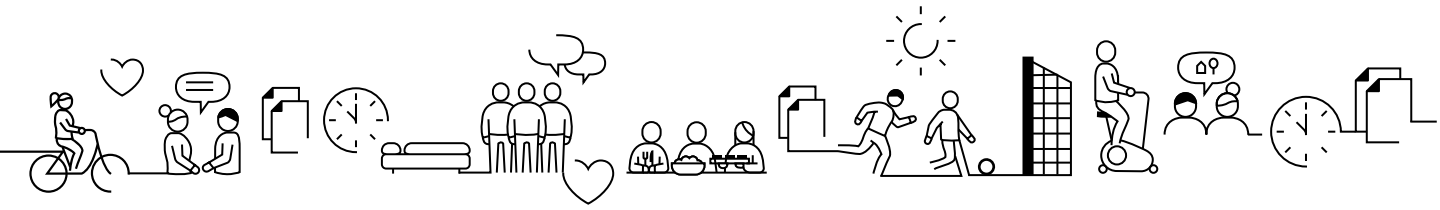
The following is evident for citizens attending the Centre for Diabetes:

- The majority of citizens were diagnosed with type 2 diabetes within the last five years.
- The majority of citizens are undergoing oral therapy.
- High blood pressure is the most frequent diabetes complication.
- Citizens diagnosed more than a year ago attend a diabetes check-up with their GP more often.

Among those citizens who have had diabetes for a longer period of time, more are undergoing injection or combination therapy. This is in line with clinical guidelines stating that, alongside lifestyle interventions, oral therapy should be the primary choice when initiating treatment for type 2 diabetes. There is also a group of citizens not undergoing medical therapy, which reflects the early stage of the condition, when lifestyle interventions are the primary choice for only slightly elevated HbA_{1c}.

Main results

Below is a summary of the key findings for the indicators included in the impact evaluation, as well as a description of how the results will be incorporated into the centre's work to develop and improve the quality of interventions so that citizens derive the greatest possible benefit from their rehabilitation programme. In respect of mental health, physical activity, and long-term blood sugar, it is particularly evident that citizens are achieving good outcomes, which in many cases are maintained beyond the programme. In other areas, such as smoking, diet and alcohol, the impact evaluation demonstrates a need to improve recruitment and the healthcare quality of the interventions.



Mental health

The main results for mental health are as follows:

- The proportion of citizens self-rating their health as 'good' or 'very good' increases from two out of five at the start of the rehabilitation programme to two out of three at the end. This increase is maintained six months later.
- At the start of the programme, 42% of citizens at the Centre for Diabetes show signs of diabetes distress. By the end of the programme, this percentage has halved, and the trend is maintained six months later.
- Compared with citizens who have 'good' or 'very good' self-rated health, citizens who have 'fair' or 'poor' self-rated health are more frequently daily smokers and physically inactive, and often have problems sleeping.
- At the start of the programme, 43% of citizens feel confident in their ability to cope with their diabetes. Six months after the end of the programme, this has increased by 30 percentage points.
- At the start of the programme, 42% of citizens feel that they are managing their diabetes. Six months after the end of the programme, this has increased by 36 percentage points.
- One-third of citizens experience being alone sometimes or often although they would prefer to be with others.

The positive results for many indicators relating to mental health should be viewed in the context of increased academic focus on the link between chronic disease and mental health. In the coming period, mental health remains a strategic priority, and interventions will take their starting point from the above results.

Smoking

The main results for smoking are as follows:

- At the start of the rehabilitation programme, around one in four citizens at the Centre for Diabetes are daily smokers.
- At the end of the rehabilitation programme, there are slightly fewer smokers, and this remains unchanged six months after the end of the programme.
- At the start of the rehabilitation programme, three out of four citizens are planning to stop smoking. At the end, this remains unchanged, while more are planning to stop smoking six months after the end of the programme.
- One in three citizens have quit smoking after a previous stop smoking intervention, while one in four have reduced their consumption.

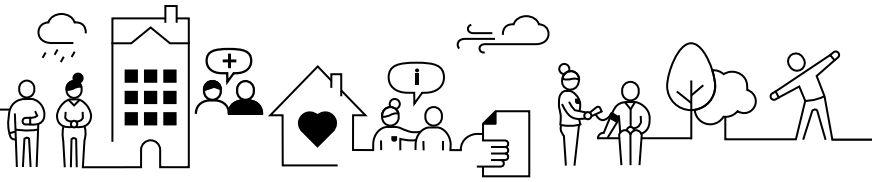
Compared with the Capital Region of Denmark's analyses of citizens with type 2 diabetes in the City of Copenhagen, the percentage of citizens who smoke attending the Centre for Diabetes is higher. This indicates that the right citizens are being referred to the programme. The majority are motivated to stop smoking, but few actually stop smoking in connection with the rehabilitation programme. Going forward, smoking will be a specific focus area at the Centre for Diabetes, and a quality-oriented effort will increase the attention on smoking in the engagement with citizens. This includes the use of the Very Brief Advice (VBA) method, recruitment to stop smoking programmes and sustained focus on smoking status.

Alcohol

The main results for alcohol are as follows:

- There are no evident changes in citizens' alcohol consumption from the start of the rehabilitation programme to six months after the end.
- At the start of the rehabilitation programme, around 40% of citizens show signs of high alcohol consumption.
- At the start of the programme, one in 10 citizens drink alcohol at least four times a week. By the end of the programme, this has fallen to one in 20 citizens.
- The majority of citizens rarely or never drink five or more units of alcohol on one occasion.
- One in five citizens have felt within the last 12 months that they should reduce their alcohol consumption.

The lack of change in alcohol consumption from the start of the rehabilitation programme to six months after the end suggests that there is a need for action in this area. This includes stronger recruitment to interventions that reduce alcohol consumption and increased collaborations targeting the group of



citizens showing signs of high alcohol consumption. It has not been possible to make comparisons with the Health Profile 2017 due to non-comparability of the questionnaire items used.

Diet

The main results for diet are as follows:

- The percentage of citizens who feel that they have healthy eating habits is twice as high at the end of the programme as at the start. Six months after the end of the programme, the level is still higher compared with the start, but lower compared with the end.
- From the start to the end of the programme, there is a general trend for citizens to eat more vegetables and a more appropriate quantity of fruit, in other words neither too much nor too little.
- At the start of the programme, a minority of citizens are eating the recommended quantities of fish and almonds/nuts. At the end of the programme and six months later, more are eating the recommended quantities.
- There is an evident trend for citizens to generally eat less cake, chocolate, sweets and ice cream at the end of the programme compared with the start.
- Generally, there is an evident trend for citizens to drink fewer sugary drinks at the end of the programme and six months later. Among those citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations, there are significantly more who are daily smokers and have a short or long sleep length compared with the group meeting the recommendations.

A general improvement is seen in the selected indicators relating to diet. Going forward, the development of intervention quality will focus on integrating the latest knowledge and organising interventions more on the basis of the individual's needs, motivation and preferences. The tools for this include habit coaching, personalised dietary plans and programmes targeting weight loss.

Physical activity

The main results for physical activity are as follows:

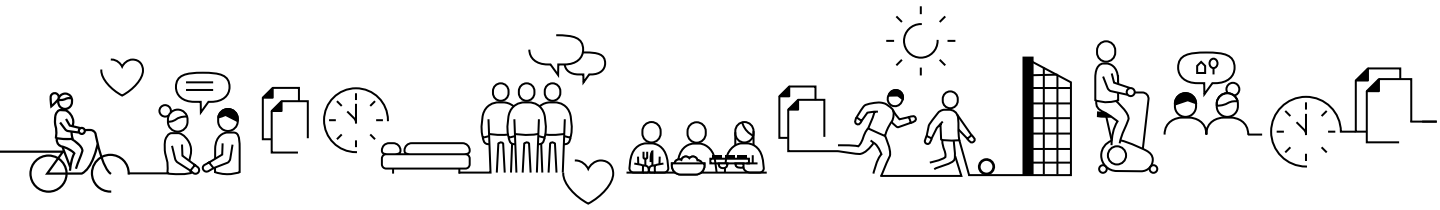
- From the baseline measurement to the final measurement, the percentage of citizens spending more than 150 minutes per week doing everyday activities rises from 30% to 40%.
- Three out of four citizens do not meet WHO's recommendation to perform ≥ 150 minutes of moderate-intensity physical activity per week.
- From the baseline measurement to the follow-up measurement, the proportion of citizens not managing to achieve an increased heart rate at any time during the course of a week (0 minutes) decreases significantly, from 25% down to 5%.
- At the start of the programme, slightly more than half of citizens get out of breath for less than 30 minutes per week and thus fail to meet the Danish Health Authority's recommendation to engage in physical activity of vigorous intensity at least twice a week for at least 20 minutes.
- At the start of the programme, one-third of citizens self-rate their physical condition as poor. By the end of the programme, this has fallen to 6%.

At the start of the rehabilitation programme, three out of four citizens would like to be more physically active. At this point, many engage in very little physical activity. However, by the end of the programme this has improved, and six months later this improvement has to some extent been maintained. Nevertheless, there is still a large group of citizens not meeting WHO's recommendations for physical activity. In order to ensure that more citizens gain the desired benefit, the focus going forward will be on tools such as heart rate monitoring, use of routine testing and citizens' adherence during and after the programme. Although the majority of citizens would like to be more physically active, the activity data show that only one in three citizens are signed up for training. This discrepancy will be investigated.

Sleep

The main results for sleep are as follows:

- One in five citizens 'never' or 'almost never' get enough sleep to feel rested.
- Of those citizens who 'never' or 'almost never' get enough sleep to feel rested, 85% have 'poor' self-rated health.



- One in five citizens sleep either too much (> 9 hours per 24-hour period) or too little (< 6 hours per 24-hour period).
- The citizens' sleep pattern does not change from the start of the rehabilitation programme to the end.

Although a large group of citizens rarely or never experience getting enough sleep to feel rested, many citizens consider they feel more rested at the end of the programme, and the trend is still present six months later. The positive development can be seen in the context of a focus on sleep as part of a healthy everyday life in diabetes education, talking therapy and so on. Compared with the Health Profile 2017, more citizens at the Centre for Diabetes have short or long sleep length.

Physiological measurements

The main results for physiological measurements are as follows:

- HbA_{1c} falls by 6.5 mmol/mol from the baseline measurement to the final measurement. This is maintained six months after the end of the programme.
- Citizens who have only had type 2 diabetes for a year have a greater decrease in HbA_{1c} compared with those who have had diabetes for longer.
- A large percentage of citizens have obesity at the start of the programme, with 66% having a BMI ≥ 30. There is a small reduction in the average BMI over the course of the programme.
- There is social inequality in the distribution of BMI ≥ 30.
- At the end of the programme, systolic blood pressure has fallen by 10.7 mm Hg, and six months later it has fallen further still.
- At the start of the programme, 76% of citizens have systolic blood pressure > 130 mm Hg. By the end of the programme, this has fallen by approximately 80 percentage points.
- Just under one in two citizens have total cholesterol > 4.5 mmol/l and one in five have LDL cholesterol > 2.6 mmol/l. At the end of the programme, no changes are evident in either total or LDL cholesterol.

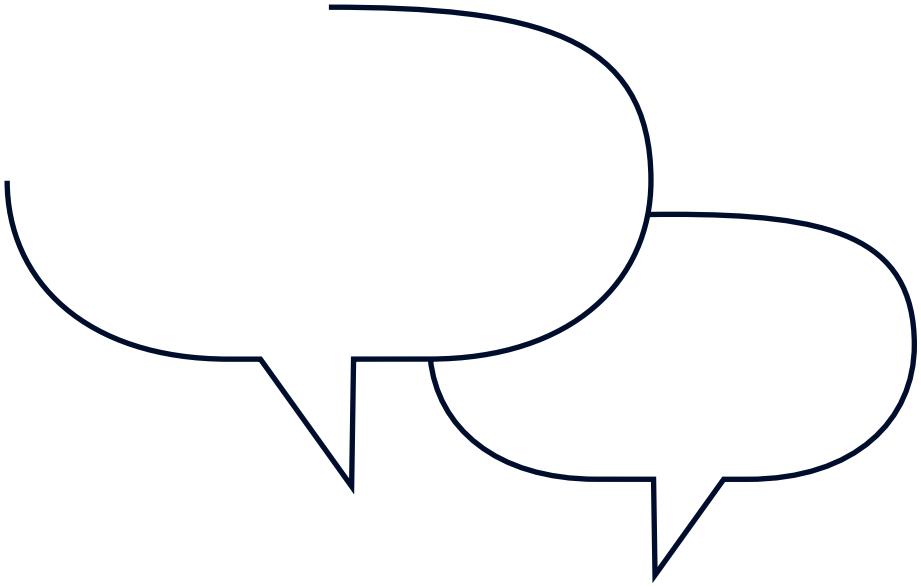
In order to give a holistic view, the impact evaluation included physiological measurements that supplement the citizen-reported data. Long-term blood sugar (HbA_{1c}) is a key indicator of well-controlled type 2 diabetes. A statistically significant improvement is seen in HbA_{1c} from the start of the rehabilitation programme to six months after the end. A lower HbA_{1c} level is considered to add value for the individual, the centre and society in general. At the same time, there is a decrease in systolic blood pressure in particular. Taken together, these improvements suggest increased coping skills on the part of citizens in terms of taking medication and being more physically active. A small reduction is seen in BMI, although this is insufficient for the citizens to meet the latest recommendations. Going forward, the focus will be on professional interventions targeting weight loss.

Motivation and goals

The main results for motivation and goals are as follows:

- Three out of four citizens rate their motivation to take part in a rehabilitation programme at the Centre for Diabetes as ≥ 7 (1 = not motivated, 10 = highly motivated).
- The majority of citizens feel that they have achieved their goals during the rehabilitation programme.
- Nine out of 10 citizens rate their motivation to make use of their new knowledge and habits as ≥ 7 (1 = not motivated, 10 = highly motivated).
- The majority of citizens feel that they have acquired new ideas for their day-to-day life with type 2 diabetes.

Citizens referred to the Centre for Diabetes are mostly motivated to take part in the programme, and the vast majority feel that they have achieved their goals. Going forward, the Centre for Diabetes will focus on using professional tools that support the citizens' work on goals. Collaboration with external partners, including general practice and civil society organisations, can help ensure that citizens maintain their goals, motivation, and healthy lifestyle.



1
INTRODUCTION

1 Introduction

This report presents the results of an impact evaluation carried out at the City of Copenhagen's Centre for Diabetes. Citizens with type 2 diabetes referred for local authority rehabilitation at the centre were invited to take part in the impact evaluation in the period from November 2018 to July 2019. The impact evaluation comprises questionnaire responses and physiological measurements collected at the start and end of the citizen's programme at the centre and at a six-month follow-up evaluation. The report describes and analyses the data generated.

Our aim in compiling this report is to strengthen the knowledge base for the local-authority rehabilitation effort for type 2 diabetes. Evidence concerning the viability of this rehabilitation effort, including the combination of multiple interventions aimed at a broader target group with varying needs, is scarce. Consequently, there is a need to develop indicators that measure the benefit that citizens derive from the rehabilitation effort [1].

The City of Copenhagen wants to help close this knowledge gap. The impact of the overall effort can be difficult to document in a clinical research set-up because the effort involves multidisciplinary integrated interventions and individuals who, in addition to chronic disease, often have other significant issues. The study at the Centre for Diabetes comprises a pre-, post- and follow-up evaluation, making it possible to describe whether citizens are deriving any benefit from the rehabilitation effort and whether they are able to maintain that benefit after the programme ends. Research-based methods and validated questionnaires were used.

The report is the first description of citizens with type 2 diabetes referred for local-authority rehabilitation. In addition to knowledge about the impact of the programme, it also provides an insight into citizens' health behaviour and status. The data generated also contribute to an understanding of the citizens who are taking part in rehabilitation programmes and those who are not. These data will be presented in a follow-up report.

1.1 Purpose

The purpose of the impact evaluation is to shed light on the value of the local-authority rehabilitation effort, which is part of the health service's overall effort to support people with type 2 diabetes. In this report, we will:

- describe the population of citizens with type 2 diabetes referred for local-authority rehabilitation in the City of Copenhagen.
- examine whether the population is benefiting from the interventions and maintaining any changes six months after the end of the programme.

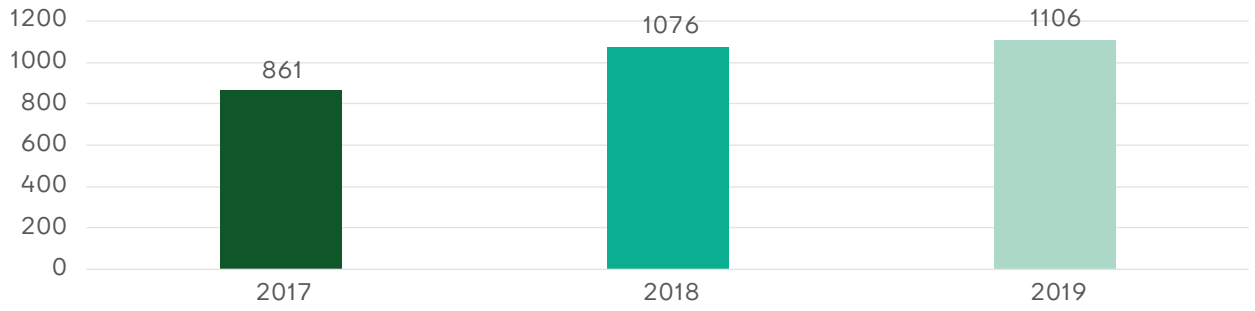
At the Centre for Diabetes, the results of the impact evaluation will be incorporated into the work to develop and improve the quality of interventions so that citizens derive the greatest possible benefit from their rehabilitation programme.

Below, we describe the rehabilitation services offered at the Centre for Diabetes, the interventions that can be included in a rehabilitation programme, the person-centred approach and the centre's day-to-day work with data and quality. The method section describes the impact evaluation's design, participants, implementation and drop-outs in the data collection, as well as the questionnaires and physiological measurements used. Finally, we present the report's structure and guidance on reading figures and tables.

1.2 Rehabilitation at the Centre for Diabetes

Around 19,400 Copenhagen residents are already living with type 2 diabetes, and each year around 1,600 are newly diagnosed with the condition. The City of Copenhagen's Centre for Diabetes is Denmark's first-of-its-kind specialised local-authority rehabilitation facility for citizens with type 2 diabetes. Since it opened in 2016, our quality work has included a focus on increasing the number of citizens referred from general practice and hospitals, and subsequently taking up a place in a programme. The number of such referrals rose from 861 in 2017 to 1,106 in 2019, an increase of 28.5% (Fig. 1.2).

Figure 1.1. *Citizens referred to the rehabilitation programme in the period 2017–2019.*



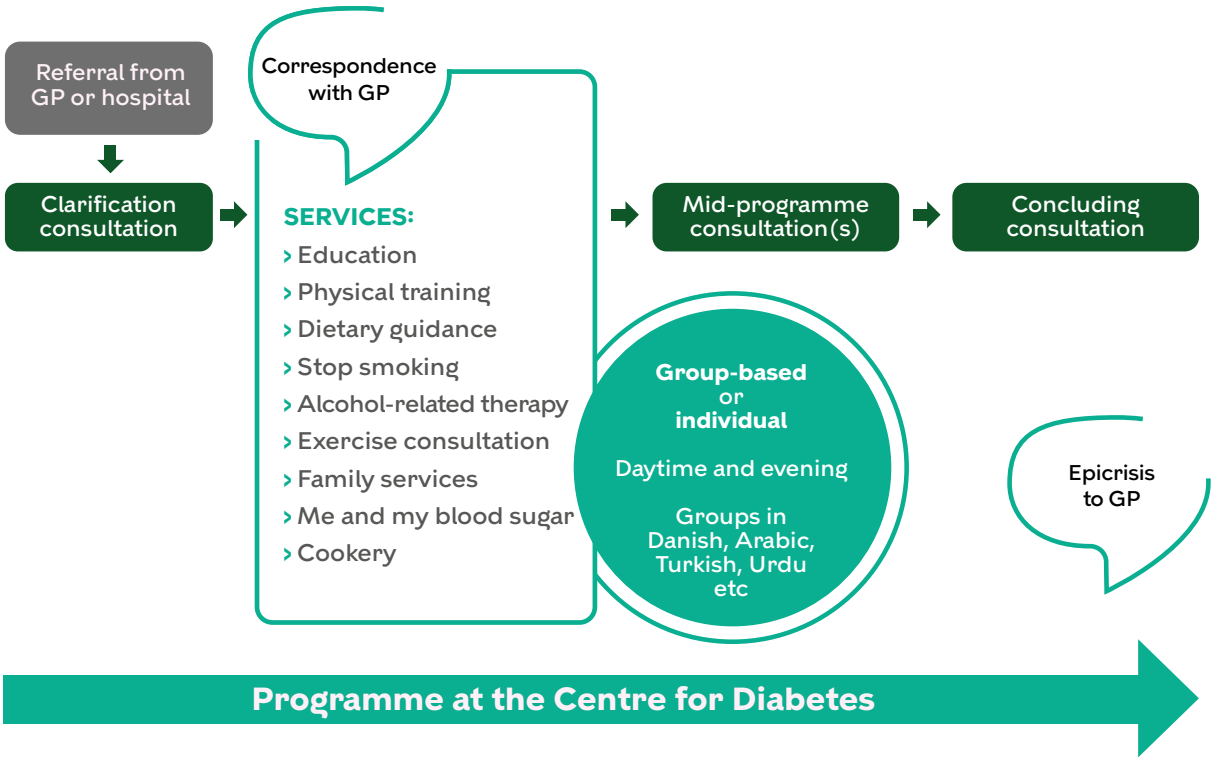
A person-centred service

The Centre for Diabetes provides a rehabilitation programme for citizens of the City of Copenhagen with type 2 diabetes whose needs are covered by the programme [2]. The programme is personalised, taking as its starting point the citizen's needs, motivation, resources and preferences. It may include patient education, physical training, nutritional intervention, practical cookery and a course in blood sugar monitoring, as well as stop smoking services and alcohol-related therapy.

The rehabilitation programme includes a series of consultations comprising an initial clarification consultation, one or more mid-programme consultations and a concluding consultation [3]. These one-to-one consultations are carried out by the same healthcare professional who monitors the citizen throughout the rehabilitation programme (Fig. 1.2). The programme is based on the professional platform described in the Disease management programme for type 2 diabetes and the Danish Health Authority's professional recommendation [2,4].

A review of the data shows that in the period 2018–2021, when the impact evaluation was carried out, 70% of citizens took part in patient education, 59% participated in physical training and 47% received personalised dietary guidance.

Figure 1.2. *The rehabilitation programme at the Centre for Diabetes.*



The general purpose of the rehabilitation programme is for citizens to acquire coping skills that enable them to manage everyday activities so that they can live a good life with their condition. Specifically, the interventions should strengthen citizens' self-care, self-efficacy and coping skills, and build up physical and mental health. All the interventions provided at the Centre for Diabetes are detailed in an Intervention Catalogue. Read more on the centre's website[5].

Quality and data at the Centre for Diabetes

At the Centre for Diabetes, data-driven quality development is a strategic objective. We work continuously to ensure and improve the quality of our services and routinely acquire knowledge and data on the interventions that we offer. Among other things, we use this knowledge to:

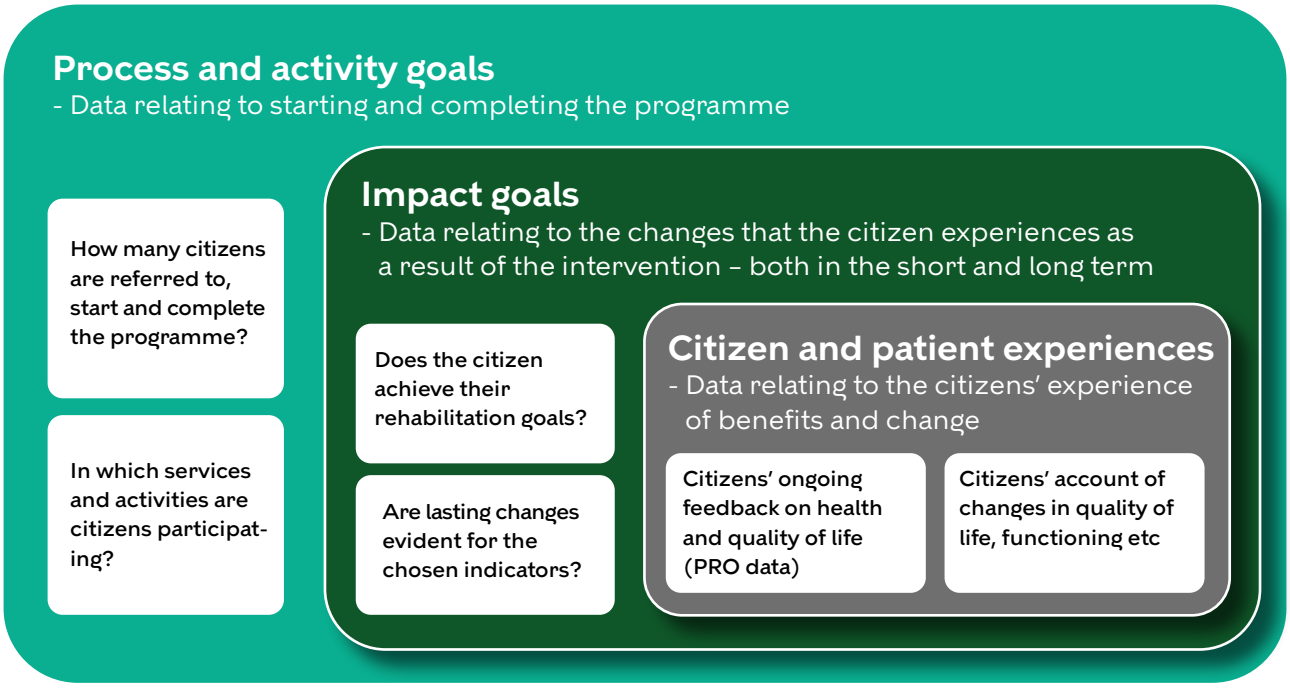
- plan and evaluate programmes, including following up on whether citizens feel that they achieve their programme goals, that the course adds value and that they acquire coping skills to manage everyday life with diabetes.
- evaluate the content and composition of the individual services and activities, including forms of interaction and health education.
- assess whether the services as a whole contribute to citizens with type 2 diabetes achieving their therapeutic goals and improving their quality of life.

What are quality data?

The Centre for Diabetes works with various types of data, both quantitative and qualitative. These are collected at various timepoints and used for various purposes in the quality work, including to assess whether rehabilitation goals are achieved at both individual and general level, and how services and interventions can be continuously developed to achieve improved quality.

The figure below depicts the centre's data model and the various types of data that are collected and analysed. The impact evaluation falls within the 'impact goals' category.

Figure 1.3. *Model for data-driven quality improvement at the Centre for Diabetes*



Process and activity goals

Process and activity goals describe the study population, in other words citizens who are referred to and use the centre's activities and services. Indicators include the number of citizens referred, from where they are referred, how many attend the initial clarification consultation, which activities the citizens engage in, and how many attend the mid-programme and concluding consultations. These data are recorded by the staff and reviewed monthly.

Impact goals

This type of data describes the changes that citizens experience during the course of the programme. It is collected in connection with this study and other research or development projects. As described in the introduction, there is a need to determine the most relevant impact goals and indicators that document the benefit that citizens derive from the local-authority rehabilitation effort.

Citizen and patient experiences

User involvement is a basic principle of the centre's work, and it is important for us to document the citizens' experience of being in contact with the Centre for Diabetes and the changes they experience in connection with the rehabilitation programme and day-to-day life with diabetes.

Patient-reported outcomes (PROs) are an important source of information on citizens' issues[1]. PROs comprise data concerning the citizen's health status, including both physical and mental health, symptoms, health-related quality of life and functional level. The Centre for Diabetes uses the national PRO diabetes form [6].

[1] PRO stands for patient-reported outcome. PROs comprise data concerning the patient's health status, including both physical and mental health, symptoms, health-related quality of life and functional level. PRO data is reported directly by the patient/citizen.

1.3 Method

Questionnaire

In order to collect information on the programme participants' health behaviour, well-being, everyday life with diabetes and diabetes complications, a 60-item questionnaire was developed *(see Appendix 1)*. Part 1 of the questionnaire was designed for this study and includes items on food, exercise habits, sleep, smoking, and alcohol based on items from the Health Profile 2017 and the Danish Diabetes Association *(see Appendix 2)*.

Part 2 of the questionnaire also includes items from other validated questionnaires for evaluating quality of life, self-rated health, diabetes complications and other factors *(see Appendix 3)*. The sources for the individual questionnaire items used in the study are stated in the relevant chapters.

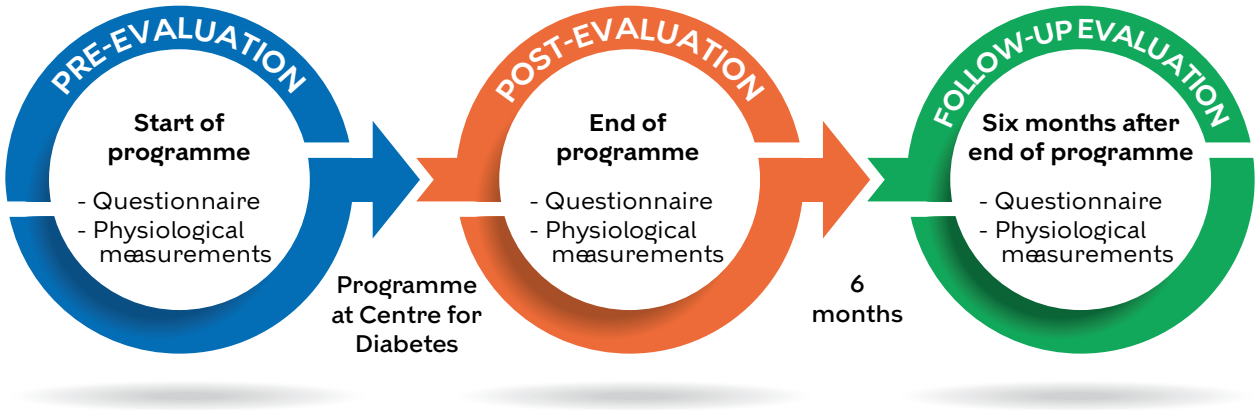
The participants completed the questionnaire in paper form on arriving at the Centre for Diabetes immediately before the initial clarification consultation (at the start of the programme), at the concluding consultation (at the end of the programme) and six months after completing the programme. The participants completed the questionnaire independently and had the opportunity to ask questions of the staff. The data were subsequently entered into Survey Exact and analysed in SPSS.

Data collection

Data collection was carried out from 1 November 2018 up to and including August 2021. Due to COVID-19, the citizens' programmes had to be extended, which also delayed the impact evaluation. The participants completed questionnaires and underwent physiological measurements at the start and end of their programme at the Centre for Diabetes, as well as at a six-month follow-up evaluation.

In this report, a programme at the Centre for Diabetes is defined as a citizen attending an initial clarification consultation, at least one individual and/or group-based intervention and a concluding consultation and at least one mid-programme consultation.

***Figure 1.4**. Data collection in the impact evaluation*



Participants

Citizens referred to a programme at the Centre for Diabetes are invited to attend an initial clarification consultation with a view to assessing their rehabilitation needs and planning a programme. Participants in the impact evaluation were recruited from among all the citizens invited to attend an initial clarification consultation in the period 1 November 2018 up to and including June 2019.

A series of inclusion criteria for participation in the impact evaluation were established:

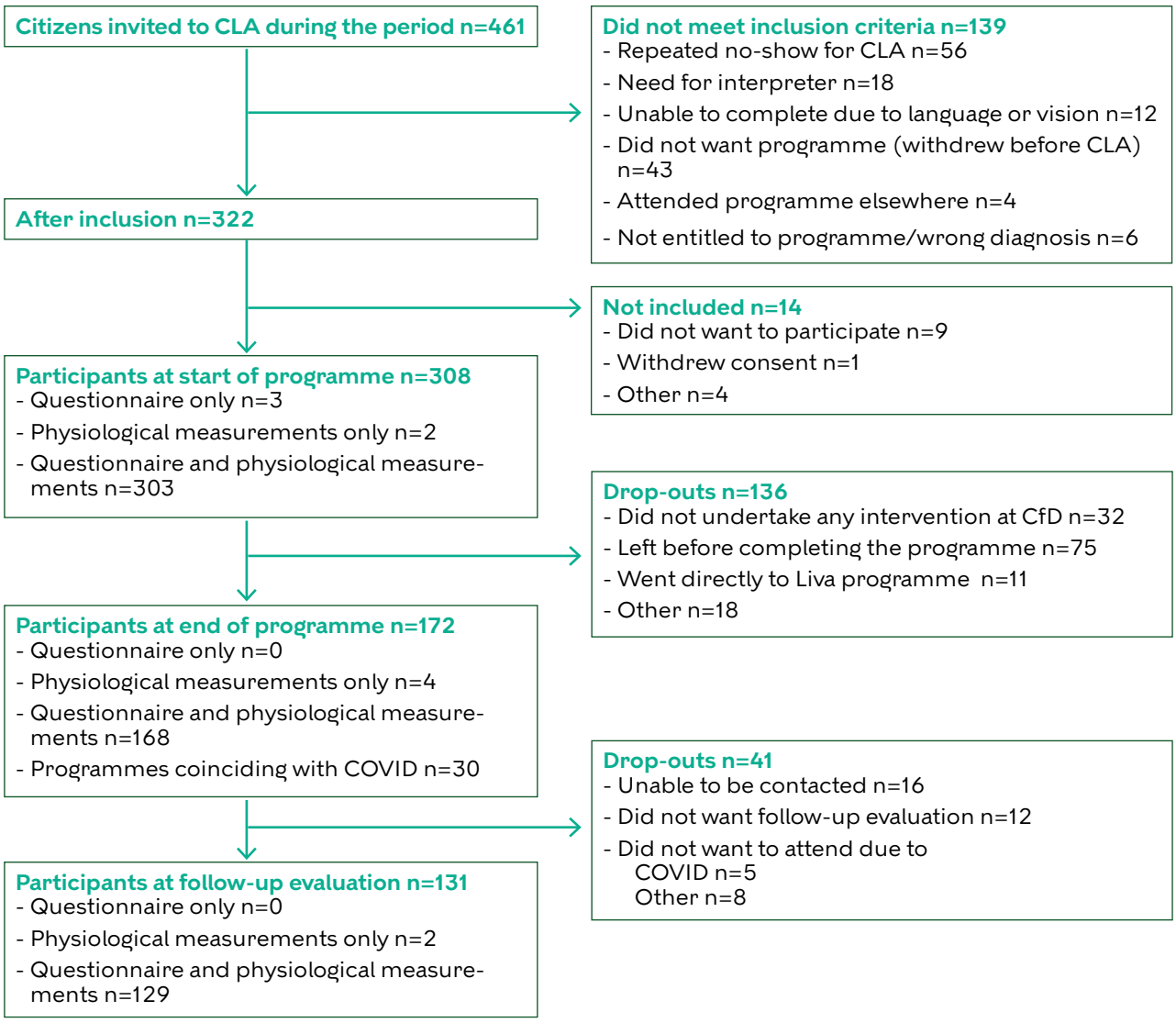
- The citizen had to have attended the initial clarification consultation.
- The citizen had to be able to read and understand Danish.
- The citizen had to be entitled to undertake a programme at the Centre for Diabetes.

Citizens gave their written consent to participate in the impact evaluation.

As can be seen from Figure 1.5, 461 citizens were invited to attend an initial clarification consultation (CLA) during the inclusion period. Of these, 139 (30%) were excluded from the impact evaluation due to not meeting the above inclusion criteria. Of the remaining 322 citizens, 308 (96%) participated in the pre-evaluation. Of these 308 citizens, 303 completed the questionnaire and underwent physiological measurements. 172 citizens (56% of those participating at the start of the programme) participated in the post-evaluation. Of these, 168 completed the questionnaire and underwent physiological measurements. 131 citizens (43% of those participating at the start of the programme) participated in the six-month follow-up evaluation.

Simultaneously with this impact evaluation, we measured the impact of patient education for citizens with a non-western background in the CUSTOM project, which is designed analogously to the impact evaluation. When CUSTOM is finished, the results will be published in a separate report[7].

Figure 1.5. *Flow chart of participants in the impact evaluation*



Physiological measurements

In order to obtain information about the participants' physical health status, physiological measurements were taken at the same time as the questionnaire was completed. The measurements included blood pressure and heart rate, HbA_{1c}, lipids, waist and hips, height, weight, body fat percentage, muscle mass and visceral fat. These are standard indicators of type 2 diabetes, and all measurements were taken by nurses or human physiologists based on well-established procedures.

HbA_{1c} and lipids

HbA_{1c} and lipid measurements were carried out in the same way as blood sugar measurement, in other words with capillary blood being taken directly from the finger. The blood was applied to a test cartridge (for HbA_{1c} or lipid profile) and analysed in an Alere AfinionTM AS100 Analyzer. The following lipids were measured: total cholesterol, LDL, HDL, triglycerides, non-HDL and cholHDL.

Blood pressure and pulse (three measurements)

Blood pressure and pulse were measured on a bare right upper arm with a calibrated electric blood pressure monitor (OMRON M3 or Microlife BP A6 PC). The blood pressure was measured after a minimum of 5 minutes' rest in a sitting position. As standard, the measurement was taken twice with a 1-minute interval. If both measurements were high (> 140/90 mm Hg), a third measurement was taken.

Waist and hips

Waist and hips were measured on bare skin (apart from underwear) with a Seca non-elastic measuring tape. Both measurements were taken with the subject standing with their legs slightly apart (15–20 cm), their arms by their side and at the end of expiration. For the waist measurement, the tape was placed midway between the lower rib curvature and the upper hip edge (iliac crest). For the hip measurement, the tape was placed horizontally around the widest point of the hips.

Height and weight

The height measurement was performed barefoot using a stadiometer (ADE model MZ10023). The participant was measured standing up against the wall with the back of their head, shoulders and heels against the measuring plate. The head was positioned in a Frankfurt plane (the lower border of the eye in line with the upper edge of the auditory meatus) before reading the height.

Weight and impedance measurements were performed barefoot wearing a single layer of clothing with empty pockets using a calibrated Tanita Body Composition Analyzer DC 360. The participants were asked whether they had a pacemaker or were pregnant, in which case they were only weighed and did not have the impedance measurement taken. The results of the impedance measurement included weight, BMI, fat percentage, muscle mass and visceral fat.

1.4 Structure of the report

The following chapters describe course of disease, health behaviour, well-being and risk factors for the citizens participating in the impact evaluation. The report describes developments in the participants' responses to the questionnaire and the results of the physiological measurements from the start through to the end of the programme and the six-month follow-up evaluation.

The report is structured as follows: chapter 2 describes demographics and social factors; chapter 3 describes course of disease and diabetes complications; chapter 4 describes mental health; chapter 5 describes smoking habits; chapter 6 describes alcohol habits; chapter 7 describes food habits; chapter 8 describes physical activity level; chapter 9 describes sleep habits; chapter 10 describes physiological goals obtained via measurements; and chapter 11 describes motivation and goals.

The emphasis of the report is on demonstrating developments in the citizens' coping skills, health behaviour, risk factors and motivation for behavioural change. Where possible, the developments are described from the start of the programme to the six-month follow-up evaluation.

1.5 Presentation of results

The results in this report are calculated as numbers or percentages/proportions for the individual indicators at the study's measurement points, namely the start and end of the programme and the six-month follow-up evaluation.

The incidence for most indicators is calculated at the start of the programme across sociodemographic groups: sex, age, education, employment status and civil status. For guidance on reading the related tables, see Figure 1.6. We also present tables of selected risk factors in combination with the health behaviour or risk factor covered by the given chapter. For guidance on reading risk tables, see Table 1.7.

Tests with a significance level of 5% were used to determine whether results are statistically significant. Statistically significant differences are indicated below each figure.

Figure 1.6. *Guide to reading tables of indicators calculated across sociodemographic factors*

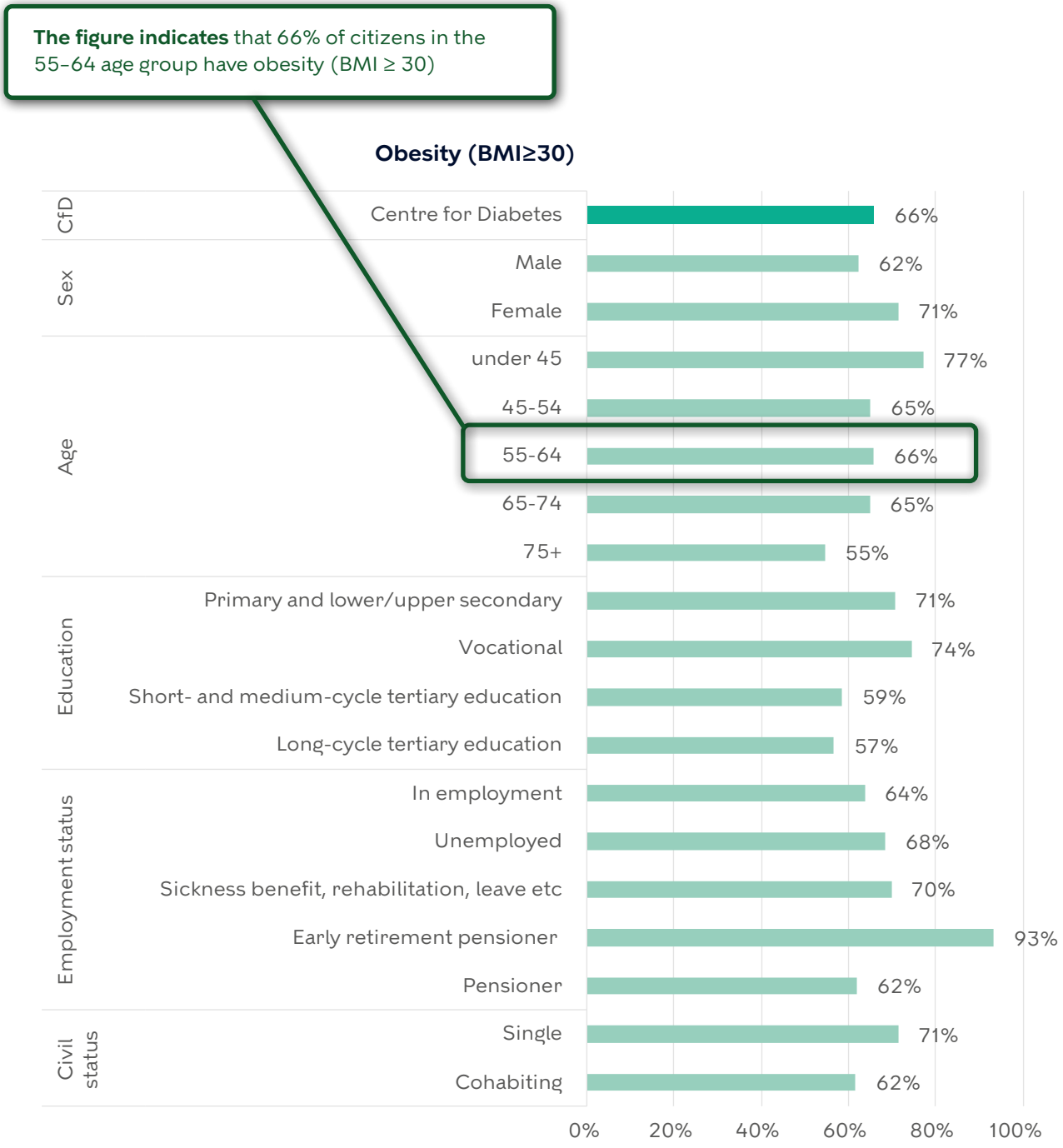


Table 1.7. *Guide to reading tables of combinations of risk factors. Tests with a significance level of 5% were used to determine whether results are statistically significant. Statistical significance is indicated by * in the table.*

Selected types of health behaviour or risk factor

The figure indicates that 76.3% of citizens with short or long sleep length also have 'not very good' or 'poor' self-rated health. * **indicates** that the percentage with 'not very good' or 'poor' self-rated health among citizens with short/long sleep length is statistically significantly different from the percentage with 'not very good' or 'poor' self-rated health among citizens with normal sleep length.

The figure indicates that 47.0% of citizens with normal sleep length have 'not very good' or 'poor' self-rated health.

	Short/long sleep length, %	**Normal** sleep length (6-9 hours), %
'Not very good' or 'poor' self-rated health	**76.3***	**47.0**
BMI ≥ 30 (obesity)	65.5	65.3
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	30.5*	18.0
Daily smoking	35.1*	21.0
Not meeting WHO's recommendations for physical activity	84.5*	66.2
'Never'/'almost never' rested	39.7*	10.9
Signs of high alcohol consumption	33.9	40.4

** Statistically significant difference from normal sleep length (6-9 hours).*

Example: Incidence of selected risk factors among citizens with short/long sleep length, and among citizens with normal sleep length.

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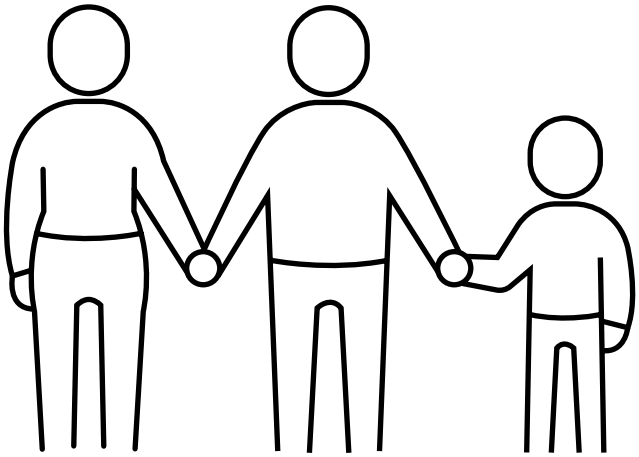
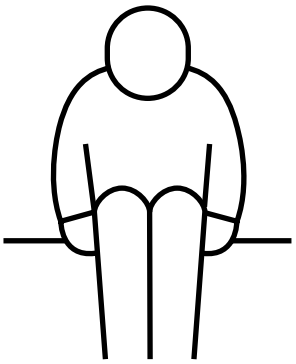




2
DEMOGRAPHICS AND SOCIAL FACTORS

2 Demographics and social factors

The right citizens are being referred to the Centre for Diabetes

Compared with the City of Copenhagen's overall diabetes population:

- There is no difference in the distribution of sexes and level of education.
- The percentage of citizens in the 45-64 age group referred to the Centre for Diabetes is higher.
- The percentage of citizens with a non-western background referred to the Centre for Diabetes is significantly higher.

There is selection bias in respect of the citizens taking part in the impact evaluation

Compared with all citizens referred for rehabilitation at the Centre for Diabetes:

- The percentage of men taking part in the impact evaluation is higher.
- The percentage of citizens with long-cycle tertiary education taking part in the impact evaluation is higher.
- The percentage of citizens with a non-western background taking part in the impact evaluation is lower.

Introduction

Health and morbidity are not equally distributed in the population. A large number of demographic and socioeconomic factors influence citizens' health behaviour and health status. This in turn influences which citizens are at highest risk of developing type 2 diabetes and which citizens develop complications as a result of their condition.

In Denmark as a whole, more men than women have type 2 diabetes[1]. This is also the case in the City of Copenhagen, where 55% of citizens with diabetes are men[2].

The incidence of type 2 diabetes rises with increasing age and decreasing length of education. The incidence is four times higher among citizens with a primary and lower secondary education compared with citizens with a long-cycle tertiary education[3].

Social health inequality manifests in a systematic correlation between social position and health. The mechanisms behind social health inequality are complex. Social and economic life circumstances impact health throughout the life span[3]. The differences in health behaviour and life expectancy, among other things, are connected in part with social differences in level of education and living conditions, and there is a tendency for better-off citizens to seek out and use health services to a greater extent.

One way to describe social inequality is based on the social gradient that expresses the link between a citizen's social position and their risk of disease[3]. In this report, education and employment status are used as measures of social position.

Education influences the citizen's ability to acquire and perform jobs with a higher income compared with unskilled jobs. In turn, income influences the citizen's ability to benefit from various material resources. At the same time, a longer education can have a positive effect on the citizen's ability to find relevant information and acquire knowledge. Through education, the citizen acquires skills that are important for their propensity to make sound decisions, including in relation to their own health.

Like education, employment status is important for the citizen's personal finances, and is thus linked to their ability to organise their lifestyle with a focus on health.

This chapter describes the demographic and socioeconomic factors among citizens entering the rehabilitation programme and taking part in the impact evaluation at the Centre for Diabetes. It concludes with an assessment of whether data from the impact evaluation are representative of all citizens referred to the Centre for Diabetes.

Figure 2.1. *Population overview*

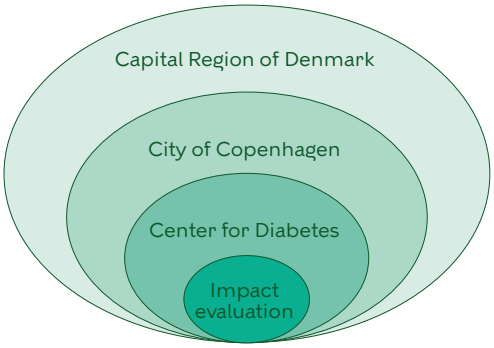


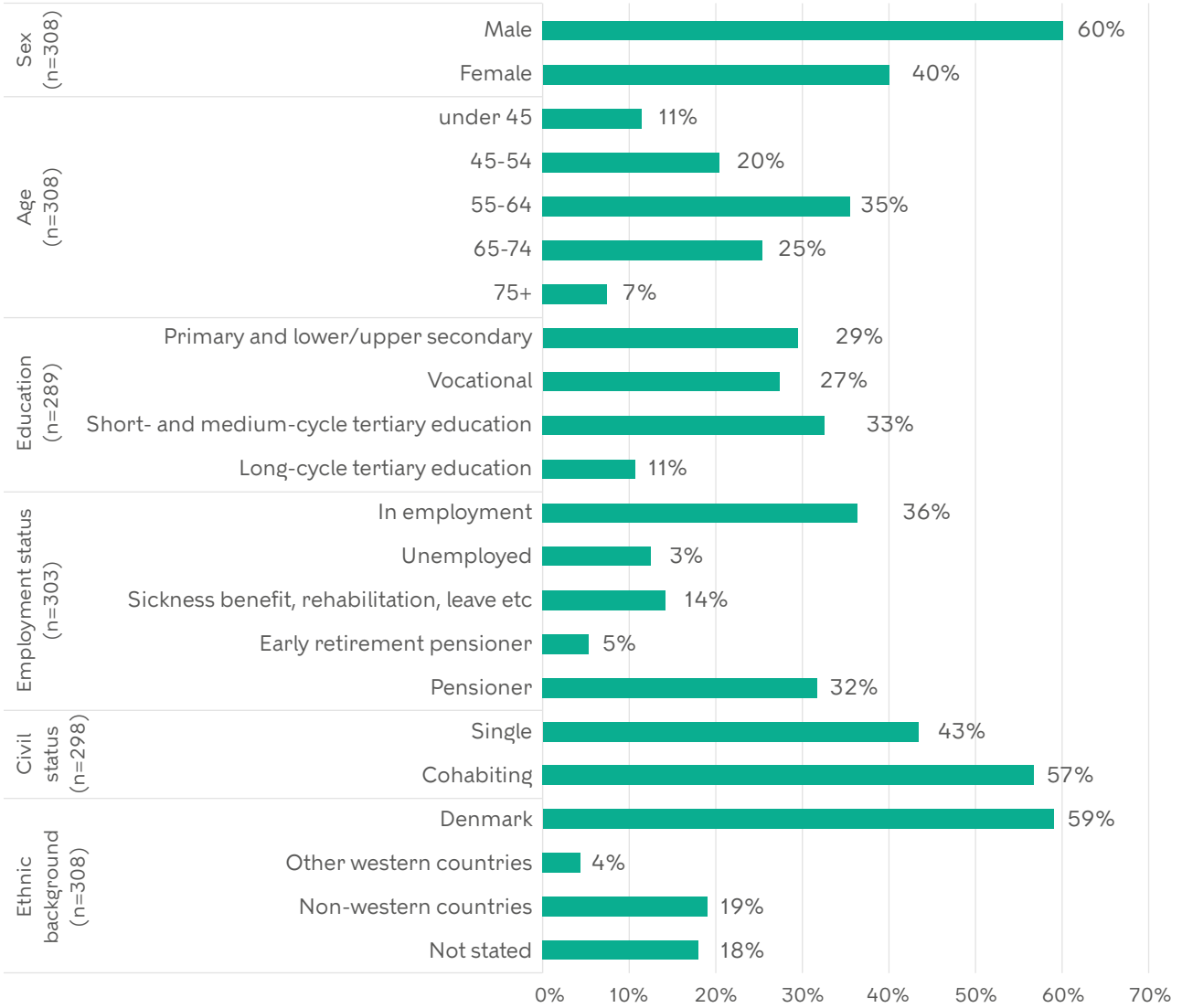
Figure 2.1 shows how results from the impact evaluation relate to all citizens at the Centre for Diabetes, citizens with diabetes in the City of Copenhagen and citizens with and without diabetes in the Capital Region of Denmark. Representativeness is assessed in section 2.6. Data relating to the Capital Region of Denmark and the City of Copenhagen originate from the Capital Region of Denmark's Health profile 2017 [3].

Data on sex, age, education, employment status, civil status and ethnic background originate from the impact evaluation questionnaire and Statistics Denmark.

Figure 2.2 shows the sociodemographic distribution of citizens taking part in the study at the start of the rehabilitation programme. The individual indicators are described in detail in the following sections.

Compared with all citizens who took part in the pre-evaluation (n=308), there is not generally a large difference in the distribution of sociodemographic factors among those citizens who took part in all three evaluations (n=131) (data not shown). However, there is an evident tendency towards slightly more drop-outs among citizens with a short education (primary and lower secondary/upper secondary), citizens not in employment (unemployed/in receipt of sickness benefit) and citizens who are single.

Figure 2.2. *Sociodemographic distribution among citizens taking part in the impact evaluation at the start of the rehabilitation programme.*



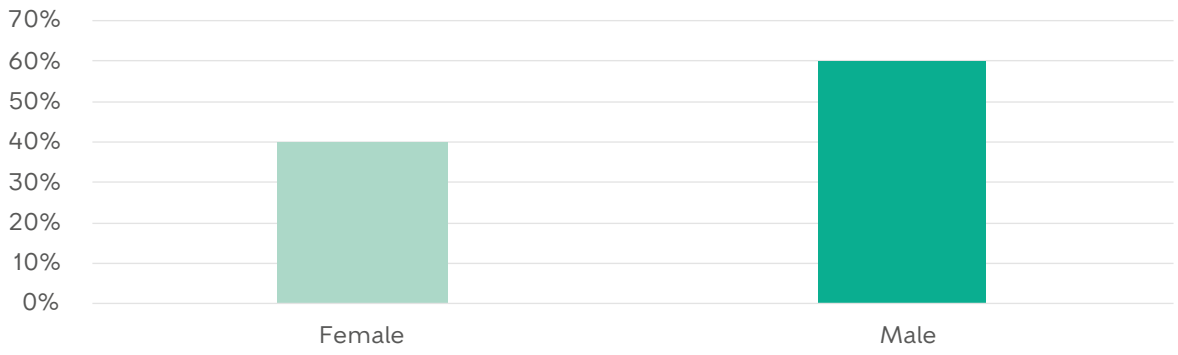
2.1 Age and sex

Sex

This section describes the distribution of men and women in the impact evaluation.

Figure 2.3 shows that among the citizens who started the impact evaluation, there are more men than women. This is in line with other studies, though there is an overrepresentation of men in this study compared with other studies *(see section 2.6)*.

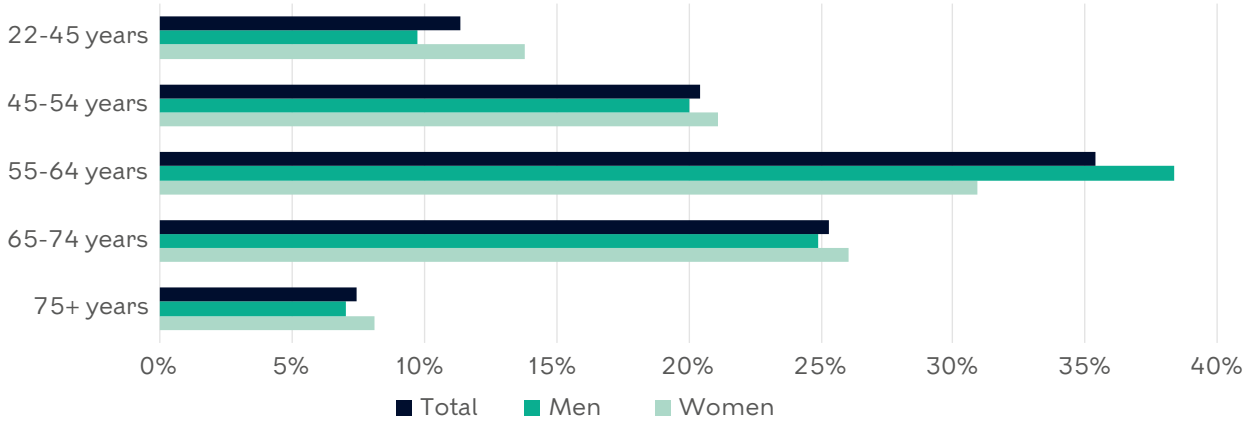
Figure 2.3. Participants' sex (n=308)



Age

Figure 2.4 shows that the largest age group is 55-64. 80% of the citizens in the study are aged between 45 and 74. Less than 10% are aged over 75. The under-45 group has more women, while the 55-64 group has more men.

Figure 2.4. *Participants' age distribution by sex (n=308)*

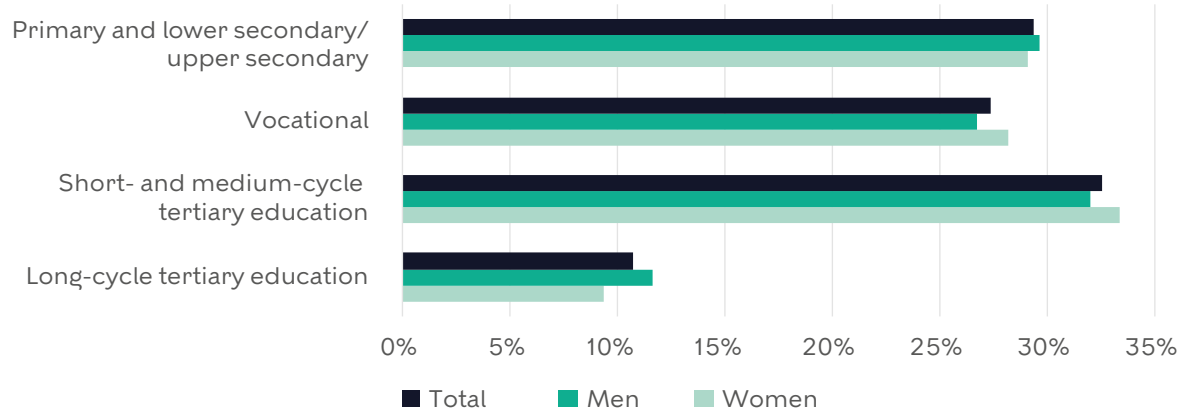


2.2 Education

In this report, education is determined based on self-reported data *(see Appendix 4)*.

Figure 2.5 shows that more than half of the citizens who took part in the impact evaluation have primary and lower secondary/upper secondary or vocational education as the highest level of education they have completed. Only one in 10 have a long-cycle tertiary education.

Figure 2.5. *Participants' education (n=289)*



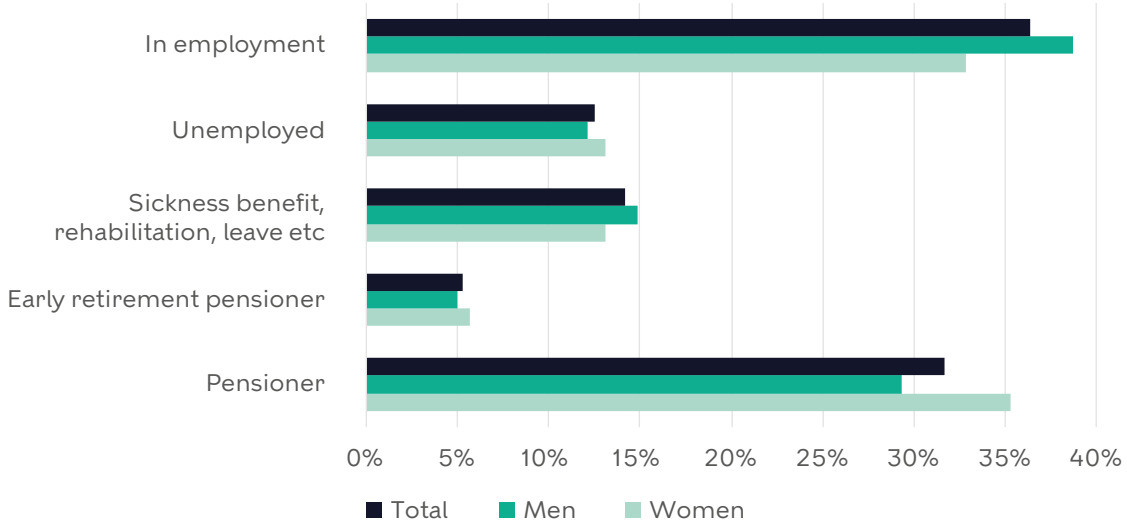
2.3 Employment status

Information on employment status in the impact evaluation is based on self-reported data *(see Appendix 4)*.

Figure 2.6 shows that slightly more than one in three citizens are in employment, with more men than women in work. The groups of unemployed people and citizens in receipt of sickness benefit, undergoing vocational rehabilitation, on leave and so on make up around 25%. Around one in three of the citizens are pensioners.

In the Health Profile 2017, the incidence of diabetes is highest among early retirement pensioners and pensioners, and lowest among citizens in employment[3]. This indicates that the impact evaluation has an overrepresentation of citizens in work.

Figure 2.6. *Participants' employment status (n=303)*



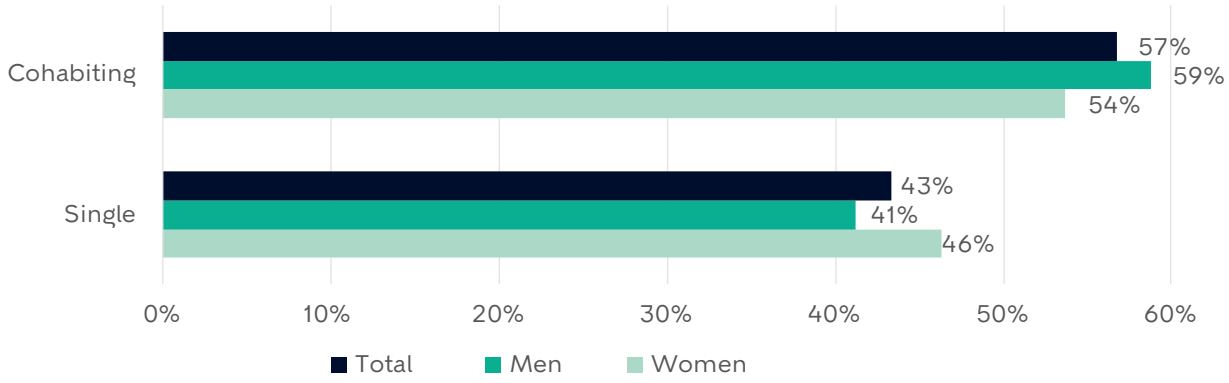
2.4 Civil status

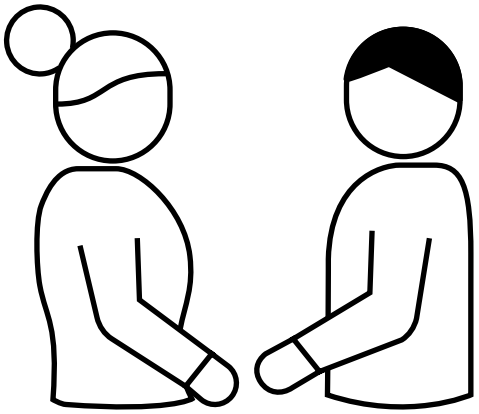
Civil status and social relationships can impact the incidence of a number of diseases, mortality and management of chronic disease.

In this report, cohabiting is defined as living together with or without common children, married or in a civil partnership. All other citizens are defined as single.

Figure 2.7 shows that slightly more than half of the citizens who took part in the impact evaluation are cohabiting, but overall civil status is equally distributed, including across sex. This is in line with figures from the Health Profile 2017 [3].

Figure 2.7. *Participants' civil status (n=298)*





2.5 Ethnic background

Ethnic background impacts the incidence of type 2 diabetes due to differences in cultural norms, health behaviour and genetic disposition. The impact evaluation only included citizens who can read and understand Danish. Ethnic background is determined based on self-reported data on the country of birth of the citizen and the citizen's parents. It is categorised into Danish, other western and non-western background.

In the report, the following categories for the participants' ethnic background are used:

Danish: Denmark.

Other western countries: Andorra, Australia, Canada, Iceland, Liechtenstein, Monaco, New Zealand, Norway, San Marino, Switzerland, the United States and the Vatican State. EU Member States: Belgium, France, Germany, Italy, Luxembourg, the Netherlands, Denmark, Ireland, the United Kingdom, Greece, Portugal, Spain, Austria, Finland, Sweden, Cyprus, Czechia, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, Slovenia, Bulgaria, Romania, Croatia.

Non-western countries: all countries other than western countries.

Figure 2.8. *Participants' ethnic background (n=308)*

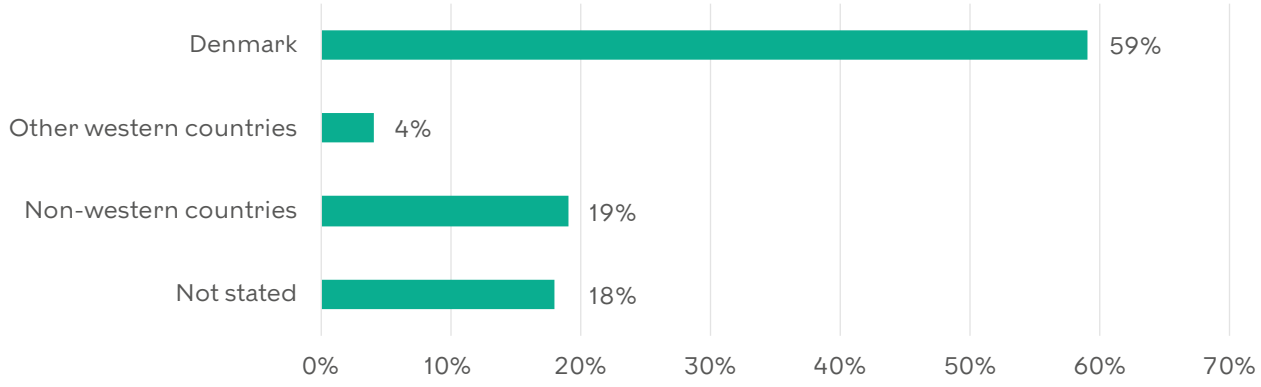


Figure 2.8 shows that the percentage of citizens in the study with a Danish background is significantly higher than the percentage of citizens with a non-Danish background. Around one in five of citizens did not state their ethnic background.

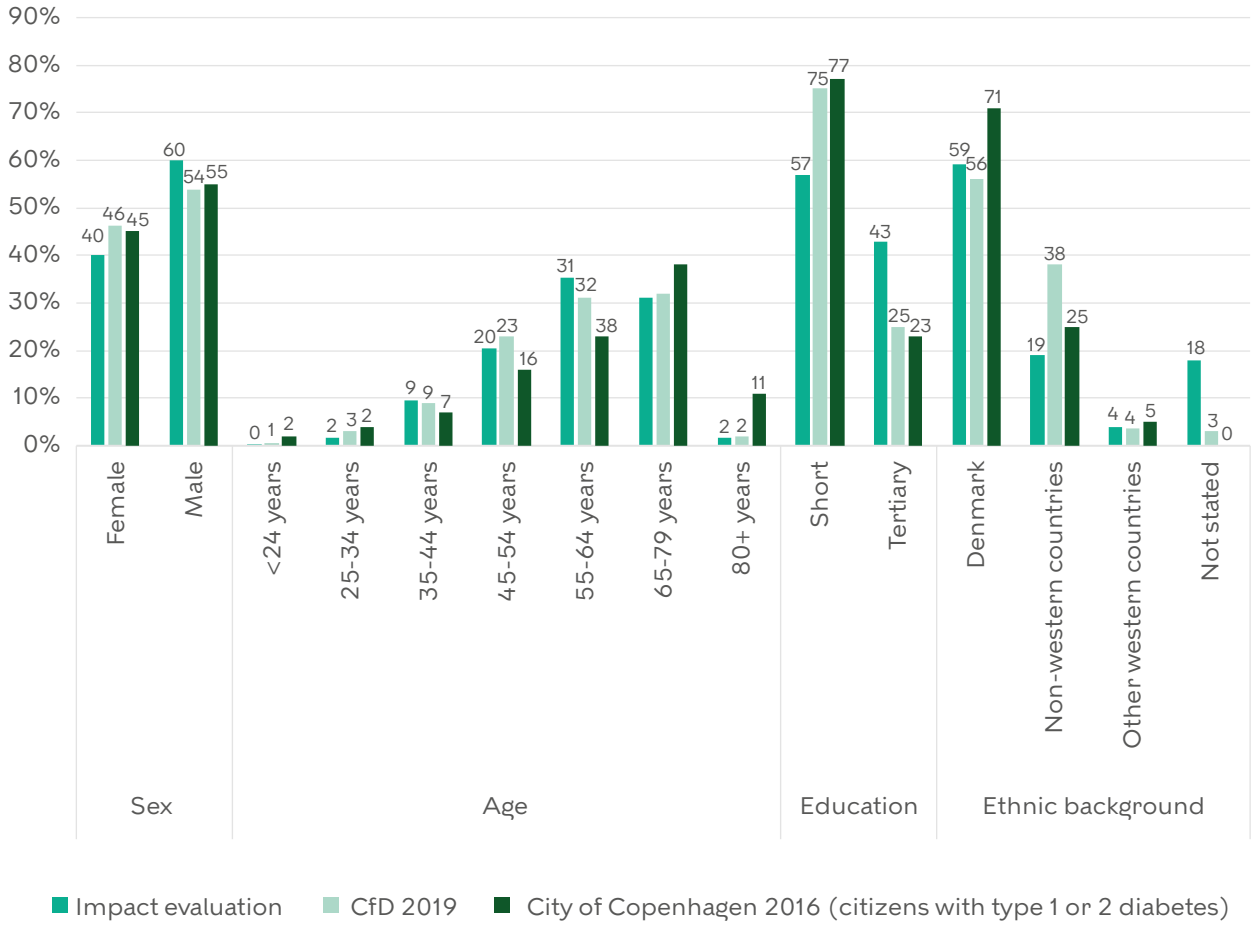
As the percentage of citizens with a non-Danish background accounts for a small amount of data, data are not calculated for the individual indicators in this report.

2.6 Generalisability

In this section, we assess whether citizens referred to the Centre for Diabetes are representative of all citizens in the City of Copenhagen with type 2 diabetes; in other words, whether the right citizens are being referred to the centre. For this purpose, the sociodemographic distribution of citizens with diabetes in the City of Copenhagen [3] is compared with that of citizens referred for rehabilitation at the Centre for Diabetes in 2019.

We also assess whether citizens participating in the impact evaluation are representative of citizens referred to the centre. For this purpose, the sociodemographic distribution of citizens referred for rehabilitation at the Centre for Diabetes in 2019 is compared with that of citizens taking part in the impact evaluation.

Figure 2.9. *Sociodemographic distribution in the impact evaluation, at the Centre for Diabetes in 2019, and among citizens with type 1 and 2 diabetes in the City of Copenhagen in 2016. Source of local-authority data: Health profile for the Capital Region of Denmark and local authorities 2017 – Chronic disease. Short education is defined as citizens whose highest completed level of education is primary and lower secondary, upper secondary or vocational*



Are the right citizens being referred to the Centre for Diabetes?

Figure 2.9 shows that the distribution of diabetes between men and women and the distribution by education level are the same among citizens with diabetes referred to the Centre for Diabetes and among citizens with diabetes in the City of Copenhagen.

It is also evident that the proportion of citizens in the 35-65 age group is higher at the Centre for Diabetes compared with all citizens with diabetes in the City of Copenhagen. As the prevention potential is highest among the youngest age groups, this is a positive finding.

In respect of ethnic background, 38% of citizens referred to the Centre for Diabetes have a non-western background, compared with 25% for all citizens with diabetes in the City of Copenhagen.

The above indicates that the right citizens are being referred to the Centre for Diabetes for rehabilitation, and that the local authority's services are not promoting inequality.

Representativeness of the impact evaluation's population

Figure 2.9 also shows that a higher percentage of men and citizens with a tertiary education, as well as a smaller percentage of citizens with a non-western background, took part in the impact evaluation compared with all citizens referred for rehabilitation at the Centre for Diabetes in 2019.

Specific inclusion criteria were imposed for the impact evaluation, including that the participants had to be able to read and understand Danish. Consequently, some citizens referred to the Centre for Diabetes were excluded from taking part in the impact evaluation. Those citizens not included in the impact evaluation for language reasons had the opportunity to take part in the CUSTOM project[4]. This project comprises an evaluation based on indicators comparable with those used in this study's impact evaluation.

The above indicates that the population in the impact evaluation was selected such that the least vulnerable citizens took part. It should therefore be assumed that some of the results of the impact evaluation are conservative.

References

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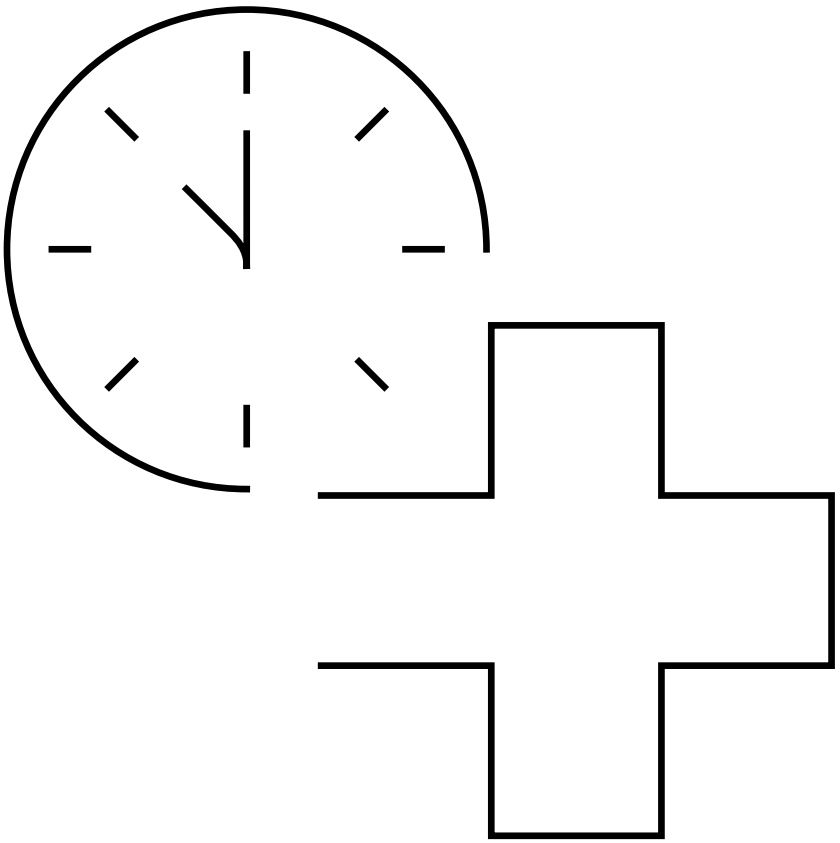


3

COURSE OF DISEASE AND DIABETES COMPLICATIONS

3 Course of disease and diabetes complications

- The majority of citizens were diagnosed with type 2 diabetes within the last five years.
- The majority of citizens are undergoing oral therapy.
- High blood pressure is the most frequent diabetes complication.
- Citizens diagnosed more than a year ago have attended a diabetes check-up with their GP more often.

Introduction

Type 2 diabetes accounts for around 90% of all cases of diabetes. The condition is characterised by a combination of the body having a reduced ability to use insulin and not being able to meet the requirements for higher insulin production. The incidence of type 2 diabetes increases with age[1].

Type 2 diabetes has many mutually dependent causes. The most important are overweight, physical inactivity, unhealthy diet and hereditary factors. The condition can have serious consequences both on the large blood vessels (macrovascular) of, for example, the heart and brain, and on the smaller blood vessels (microvascular) of the eyes, kidneys and nervous system (especially in the feet). People with type 2 diabetes have a two to four times increased risk of dying of cardiovascular disease compared with the rest of the population. Around one in five citizens with type 2 diabetes also have heart disease.

Annually, diabetes results in 1,300 deaths and 5,700 years of lost life among Danish men and women[1].

The local authority rehabilitation effort is part of the overall multidisciplinary and coordinated rehabilitation effort to support people with diabetes, which is described in the Disease management programme for type 2 diabetes. Part of the rehabilitation programme is a focus on the course of the condition and preventing any complications and comorbidities in order to support citizens with type 2 diabetes so that they can live well with their condition day to day[2].

This chapter describes the citizens' course of disease based on time since diagnosis, medical therapy, diabetes complications and diabetes check-ups. The chapter takes as its starting point the citizens' pre-evaluation at the start of the rehabilitation programme.

3.1 Time of diagnosis and medication

This section describes how long citizens referred to the Centre for Diabetes have had type 2 diabetes and the antidiabetic medication with which they are being treated.

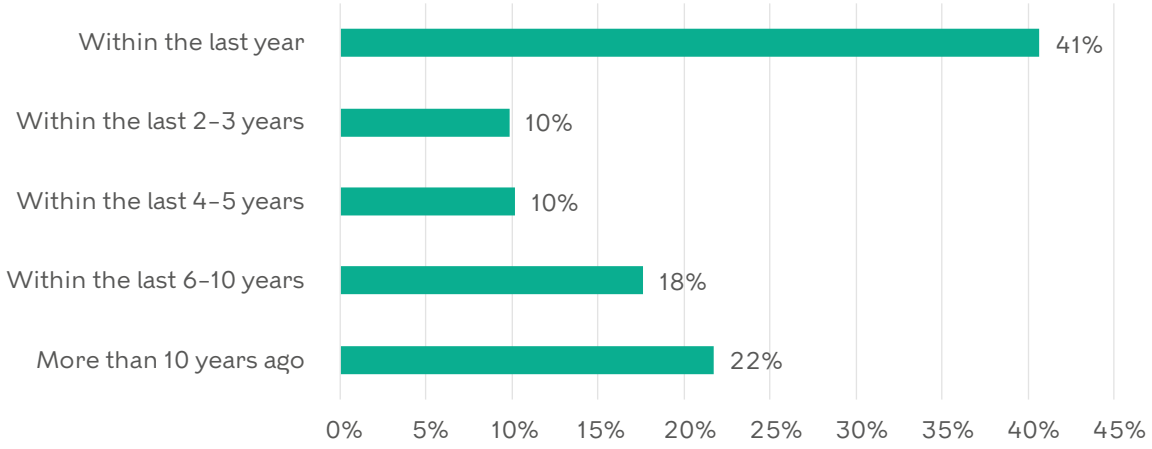
The following questionnaire items provide the basis for this section:

- When were you diagnosed with type 2 diabetes?
- Has your doctor prescribed tablets for your diabetes?
- Has your doctor prescribed injections for your diabetes (eg insulin)?

Time of diagnosis

Figure 3.1 shows that around 40% of citizens are newly diagnosed, receiving a diagnosis of type 2 diabetes within the last year. The figure also shows that 40% have had diabetes for six years or longer.

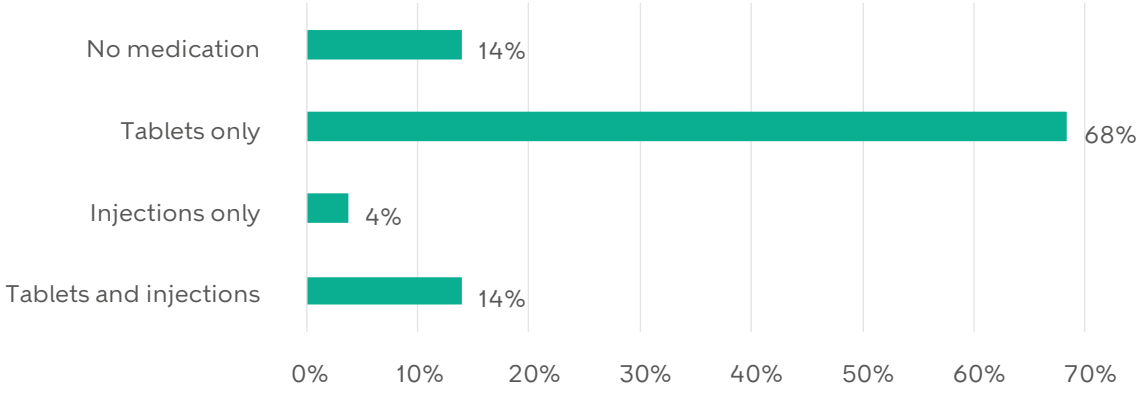
Figure 3.1 *Time of diagnosis (n=295)*



Prescribed diabetes medication

Figure 3.2 shows that the majority of citizens are undergoing oral therapy for their type 2 diabetes. A smaller percentage are undergoing combination therapy in the form of both oral and injectable medication, and less than 5% of citizens are undergoing injectable therapy only. A small percentage are not receiving medication for their type 2 diabetes.

Figure 3.2 *Prescribed diabetes medication (n=294)*

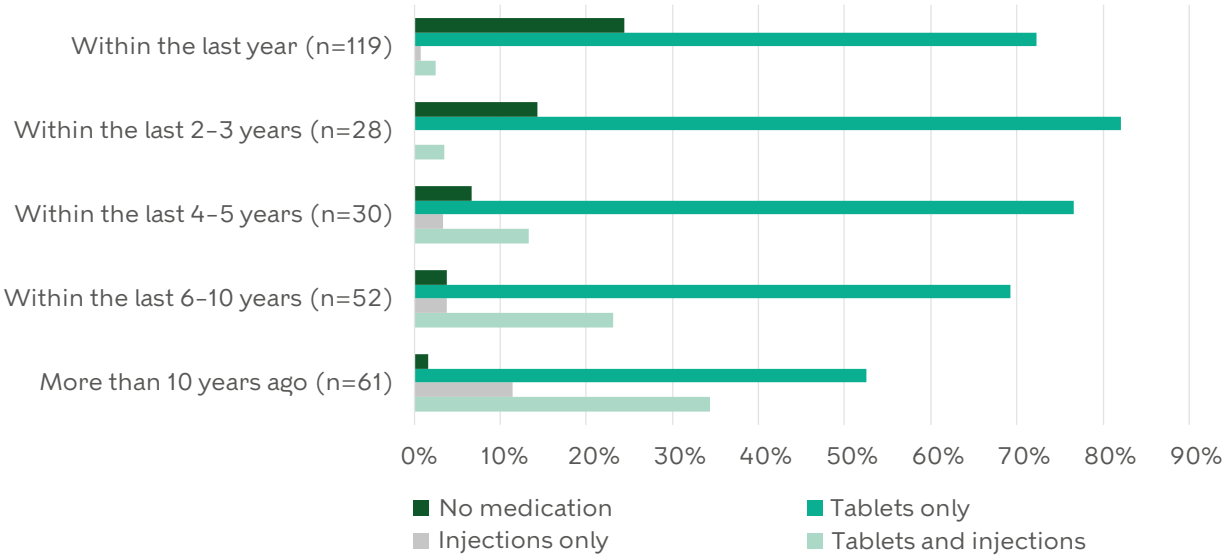


Medication and time since diagnosis

Figure 3.3 shows that the vast majority of citizens, regardless of time since diagnosis, are undergoing oral therapy only. In the case of citizens diagnosed with type 2 diabetes more than 10 years ago, one in three are undergoing a combination of oral and injectable therapy. The percentage of citizens not undergoing medical therapy falls with increasing duration of disease.

Figures 3.1 and 3.2 show that the majority of citizens are relatively newly diagnosed, and that the majority are undergoing oral therapy. Figure 3.3 shows that with longer duration of disease, more citizens progress to injectable or combination therapy. This is in line with clinical guidelines, with metformin oral therapy, alongside lifestyle interventions, being the primary choice when initiating treatment for type 2 diabetes. The percentage of citizens not undergoing medical therapy indicates the early stage of the condition, when lifestyle interventions are the primary choice for only slightly elevated HbA_{1c} [3].

Figure 3.3 *Medication and time since diagnosis (n=290)*



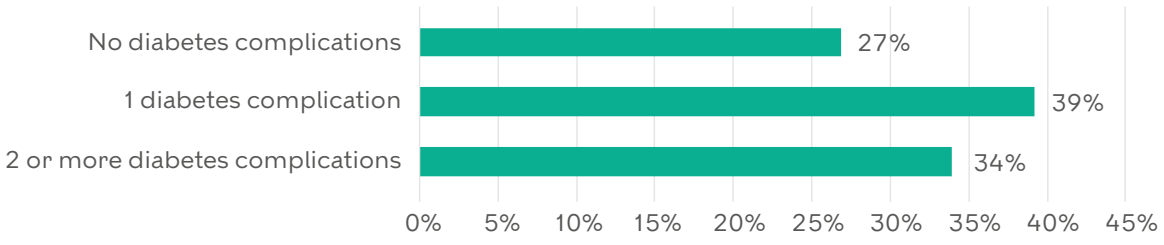
3.2 Diabetes complications

The risk of developing diabetes complications increases with the duration of the condition. Furthermore, there is an evident correlation between a prolonged high level of HbA_{1c} and the development of diabetes complications [4].

Data were collected for the five most frequently occurring diabetes complications: retinopathy (eye disease), neuropathy, diabetic foot, kidney disease (which can occur as a result of poorly regulated diabetes) and periodontitis (an infectious gum disease).

Figure 3.4 shows that one in four citizens do not have any diabetes complications. Around 40% have one complication, and slightly more than one in three have two or more complications.

Figure 3.4 *Number of diabetes complications (n=283)*



The following questionnaire item provides the basis for this section:

- Do you suffer from any of the following diabetic problems?

Figure 3.5 shows that one in four citizens have periodontitis, one in four have neuropathy, slightly fewer than one in 10 have retinopathy, the same for kidney disease, and a small percentage have diabetic foot. In this figure, high blood pressure is included as a diabetes complication rather than a risk. It is evident that slightly more than half the citizens have high blood pressure.

Figure 3.5 *Diabetes complications (n=283)*

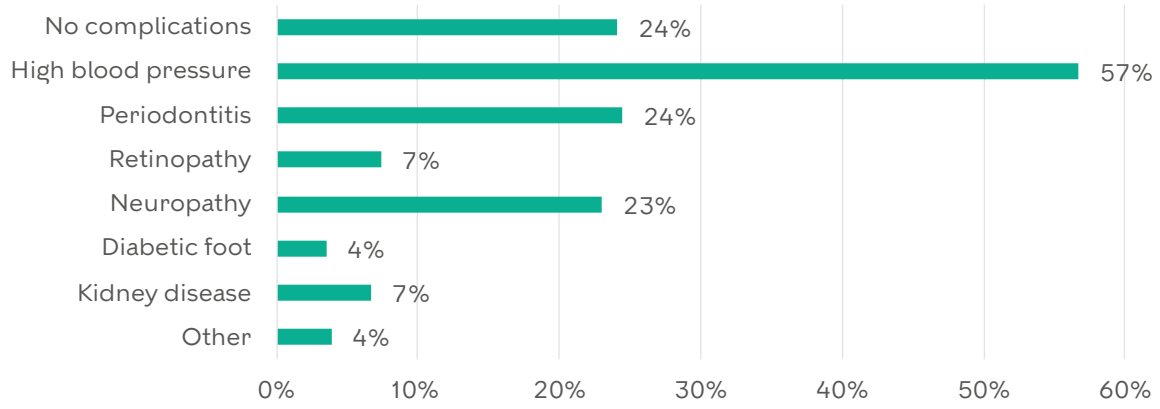
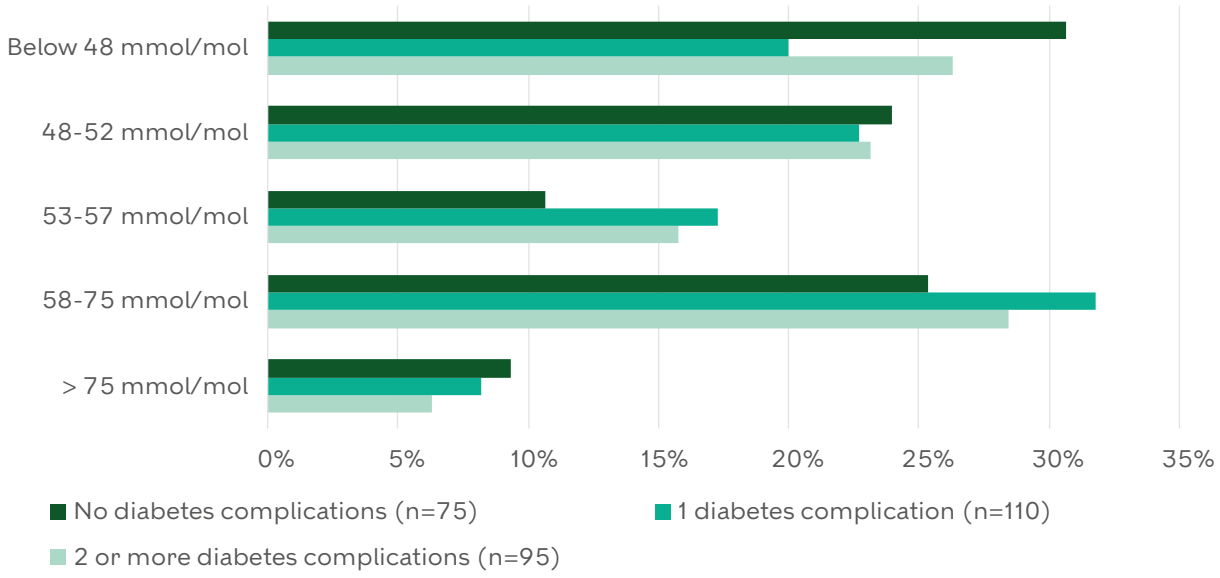


Figure 3.6 shows the distribution of diabetes complications across various HbA_{1c} categories. No clear difference is evident across diabetes complications and HbA_{1c} categories.

Figure 3.6 *Diabetes complications relative to HbA_{1c} values*



3.3 Health service check-ups

It is recommended as standard that citizens with type 2 diabetes attend one annual status examination with their GP. In addition, check-ups with a dentist on a regular basis, with a podiatrist at least once a year and with an ophthalmologist every two years are also recommended[5].

The respective healthcare professionals (HCPs) assess the individual need for check-ups in their particular fields, with the result that the number of consultations varies from citizen to citizen. In order to delay and reduce the severity of diabetes complications connected with type 2 diabetes, it is important for citizens to attend scheduled health service check-ups.

According to the Health Profile 2017, virtually all citizens with type 2 diabetes in the Capital Region of Denmark have contact with a general practice and 60% have contact with a specialist practice[1].

The following questionnaire items provide the basis for this section:

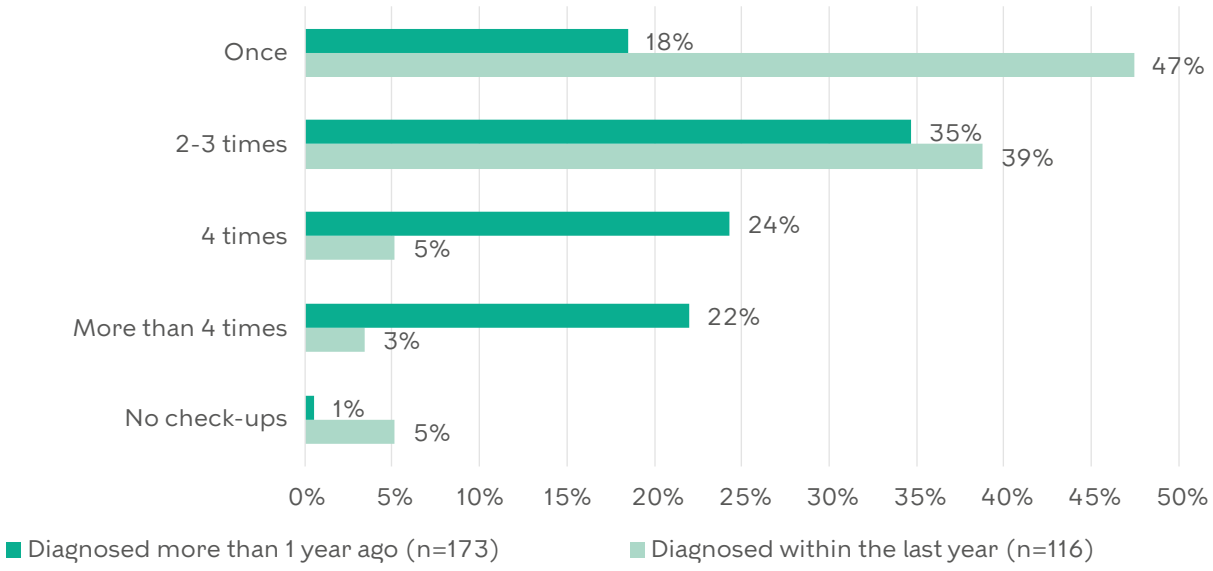
- How many times in the last year have you attended a check-up with your GP or at a hospital?
- How many times in the last year have you attended a check-up with your podiatrist?
- How many times in the last year have you attended a check-up with your ophthalmologist?
- How many times in the last year have you attended a check-up with your dentist?

Diabetes check-ups with your GP or at a hospital

Figure 3.7 shows that among newly diagnosed citizens, almost half have attended a check-up with their GP or at a hospital once in the last year and slightly fewer have attended two to three check-ups. A very small number have not attended a check-up.

Among citizens diagnosed more than a year ago, almost half have attended four or more check-ups in the last year. Fewer than one in 10 have not attended a check-up. The number of check-ups increases with the duration of the condition.

Figure 3.7 *Diabetes check-ups with your GP or at a hospital*

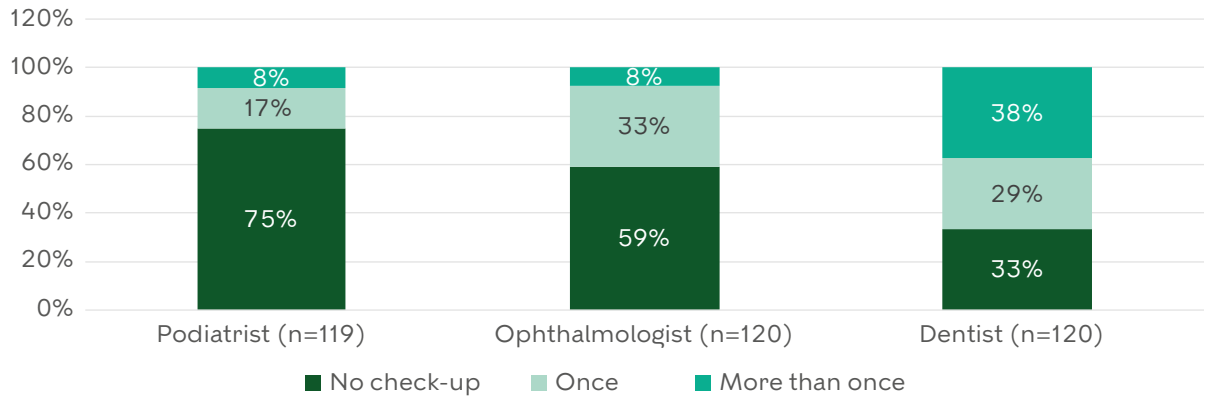


Check-ups with HCPs among newly diagnosed citizens

Figure 3.8 shows the distribution of check-ups across podiatry, ophthalmology and dentistry for the group of citizens diagnosed within the last year. Three out of four citizens have not attended a check-up with a podiatrist, three out of five have not attended a check-up with an ophthalmologist and one in three have not attended a check-up with a dentist.

One in four citizens have attended a check-up with a podiatrist, 40% with an ophthalmologist and two out of three with a dentist.

Figure 3.8 *Check-ups with HCPs among newly diagnosed citizens (within the last year)*

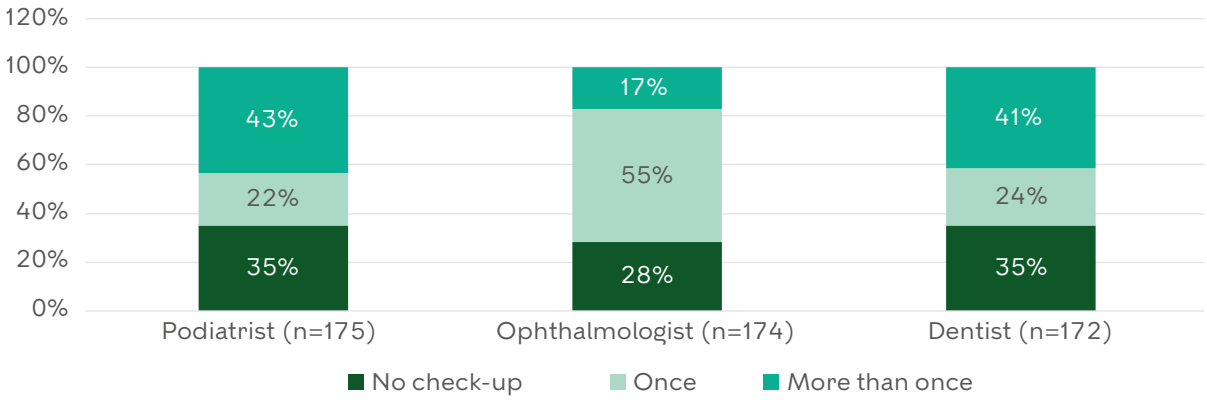


Check-ups with HCPs among citizens diagnosed more than a year ago

Figure 3.9 shows that two out of three citizens diagnosed with type 2 diabetes more than a year ago have visited a podiatrist and dentist at least once, whilst almost three out of four have visited an ophthalmologist at least once.

The percentage of citizens who have not attended a check-up with an ophthalmologist or podiatrist in the last year is far smaller compared with the group of newly diagnosed citizens (Fig. 3.9), while the percentage of citizens who have not attended a check-up with a dentist is almost the same in both groups.

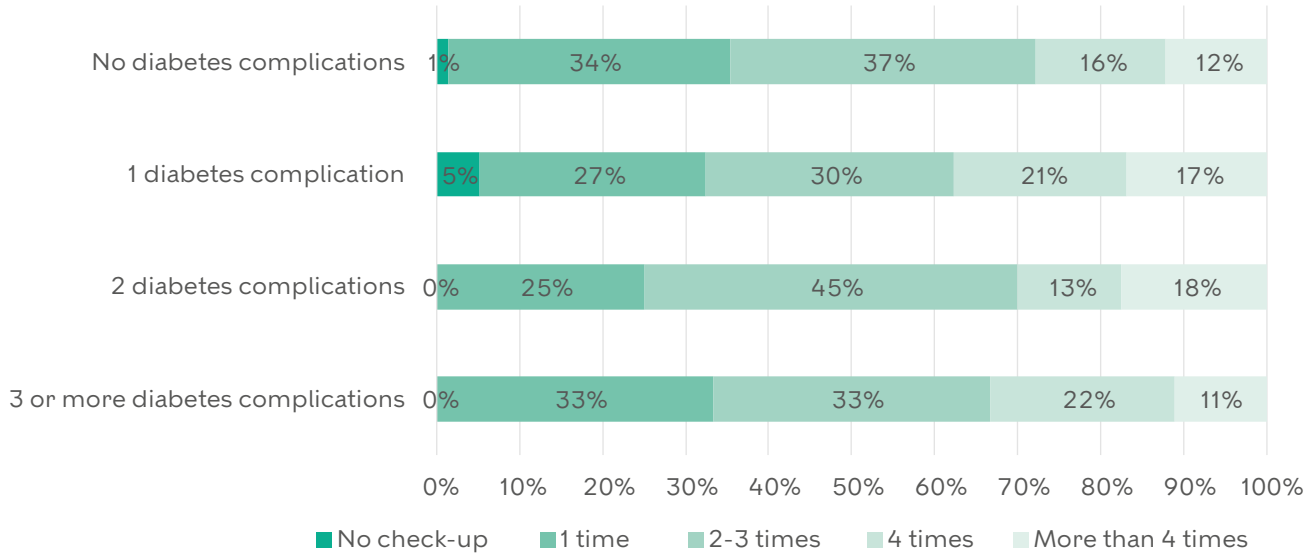
Figure 3.9 *Check-ups with HCPs among citizens diagnosed more than a year ago*



Diabetes complications and check-ups with a GP or at a hospital

Figure 3.10 shows the correlation between diabetes complications and number of check-ups per year with a GP or at a hospital. Generally, there is no pattern in the relationship between number of diabetes complications and number of check-ups. Around one in three citizens attend a check-up annually regardless of the number of diabetes complications. Similarly, 30-45% attend two to three check-ups annually and one in three attend four or more check-ups.

Figure 3.10 *Diabetes complications and check-ups with a GP or at a hospital (n=274)*



3.4 Multiple chronic diseases

Many citizens live with two or more concurrent chronic diseases across somatic and mental health diagnoses, which is referred to as multiple diseases and is very common[1]. It is difficult to make comparisons with other data because the definition of multiple diseases varies.

Cardiovascular disease is frequently seen concomitantly with type 2 diabetes, because arteriosclerosis develops in the heart and blood vessels as a result of high blood sugar, high blood pressure and high cholesterol[6]. Around one in five citizens with type 2 diabetes in both the Capital Region of Denmark and the City of Copenhagen have these two chronic conditions at the same time[1,7].

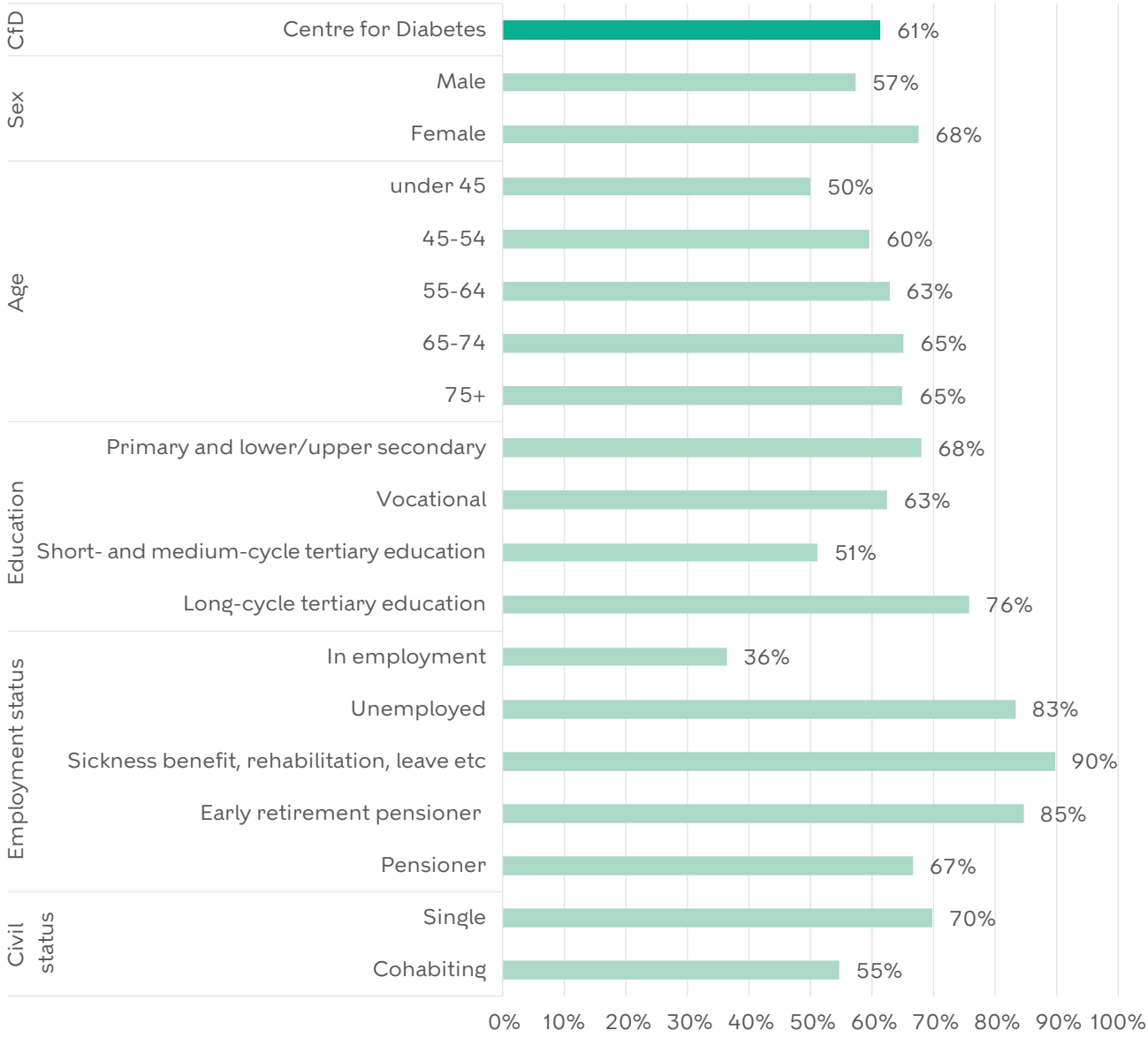
Incidence of chronic diseases in addition to type 2 diabetes

The following questionnaire item provides the basis for this section:

- Has your doctor told you that you have one or more of the following diseases or conditions?
  - o Arthritis, cardiovascular disease, depression, anxiety, dental or oral disease, COPD, other mental health disorder, osteoporosis, cancer or other symptoms of diseases/conditions.

Figure 3.11 describes the sociodemographic distribution of citizens with one or more chronic diseases in addition to type 2 diabetes.

Figure 3.11 *One or more chronic diseases in addition to diabetes*



Centre for Diabetes: Overall, almost two out of three citizens have one or more chronic diseases in addition to type 2 diabetes.

Sex: More women than men have multiple chronic diseases. Seven out of 10 women and around six out of 10 men have one or more chronic diseases in addition to type 2 diabetes.

Age: Half of the citizens under 45 have multiple diseases. The percentage increases with age.

Education: Three out of four citizens with long-cycle tertiary education have multiple diseases. In the other groups, the incidence of multiple diseases decreases with increasing length of education.

Employment status: Slightly more than one in three citizens in employment have multiple diseases, which is significantly lower compared with the other groups. Among the unemployed, recipients of sickness benefit, early retirement pensioners and so on, more than nine out of 10 citizens have multiple diseases. The number is slightly lower among pensioners. The between-group differences are statistically significant.

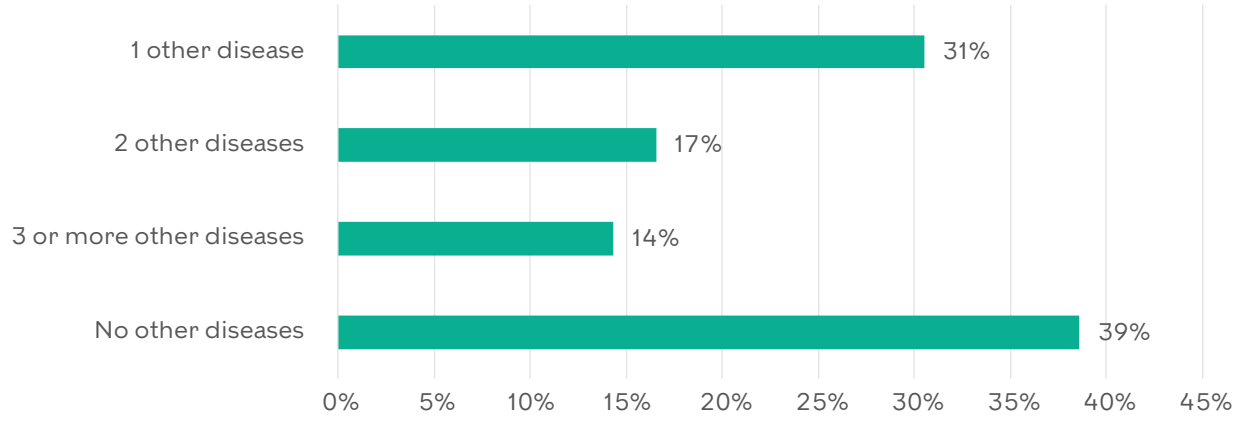
Civil status: Almost three out of four single citizens have multiple diseases, which is higher than for the cohabiting group, where slightly more than half have multiple diseases. The difference is statistically significant.

Number of chronic diseases in addition to type 2 diabetes

Figure 3.12 shows that one in three citizens at the Centre for Diabetes have one other chronic disease, while 17% have two other diseases and slightly fewer have three or more other diseases. Four out of 10 citizens state that they do not have any chronic diseases other than type 2 diabetes.

This is comparable with the Health Profile 2017, where slightly more than half of the citizens have one or more other chronic diseases[1].

Figure 3.12 *Number of chronic diseases in addition to diabetes (n=272)*



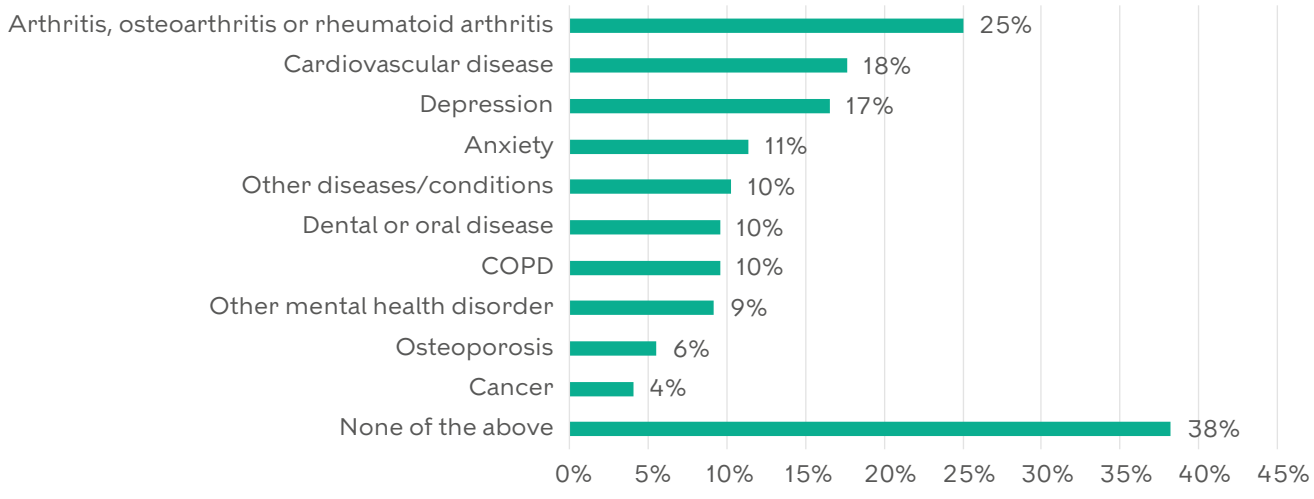
Other diseases in addition to type 2 diabetes

Figure 3.13 shows that the diseases most frequently occurring in combination with type 2 diabetes are inflammatory joint diseases, cardiovascular diseases, and depression.

One in four citizens have inflammatory joint diseases, such as arthritis, osteoarthritis and rheumatoid arthritis, which is more than twice as many compared with the type 2 diabetes population of the Capital Region of Denmark, where fewer than one in 10 citizens have these diseases. Around one in five citizens at the Centre for Diabetes also have cardiovascular disease, which is on a par with the incidence in the Capital Region of Denmark. Around one in five citizens have depression, twice as many as in the Capital Region of Denmark, where slightly fewer than one in 10 have depression[1].

Four out of 10 citizens do not have any chronic diseases other than type 2 diabetes.

Figure 3.13 *Chronic diseases or conditions in addition to diabetes (n=272)*



Sexual problems

Many citizens experience sexual problems connected with type 2 diabetes, including reduced libido (in both sexes) and erectile dysfunction in men. Both arteriosclerosis and neuropathy can be a cause of such problems, as can medication[8].

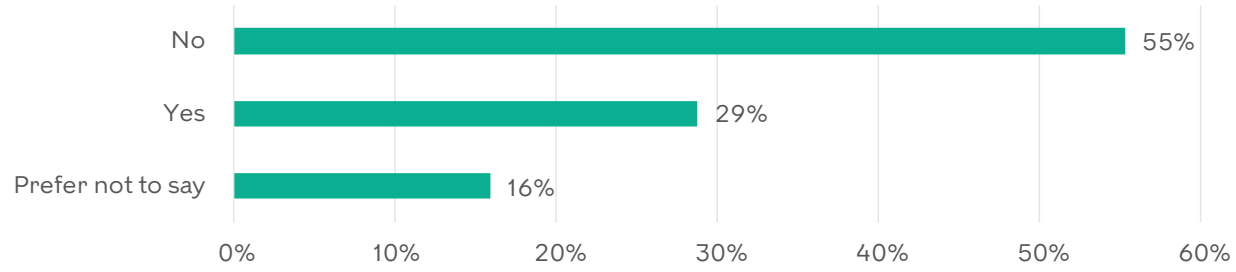
Sexual problems can impact both physical and mental health. Many inconveniences can be remedied through appropriate therapy and focus on rehabilitation.

The following questionnaire items provide the basis for this section:

- Do you experience sexual problems?
- Do you think the sexual problems are because of your diabetes?

Figure 3.14 shows that almost one in three citizens are experiencing sexual problems at the start of the rehabilitation programme, while slightly more than half are not experiencing any sexual problems. Around one in five prefer not to say whether they are experiencing sexual problems.

Figure 3.14 *Sexual problems (n=264)*

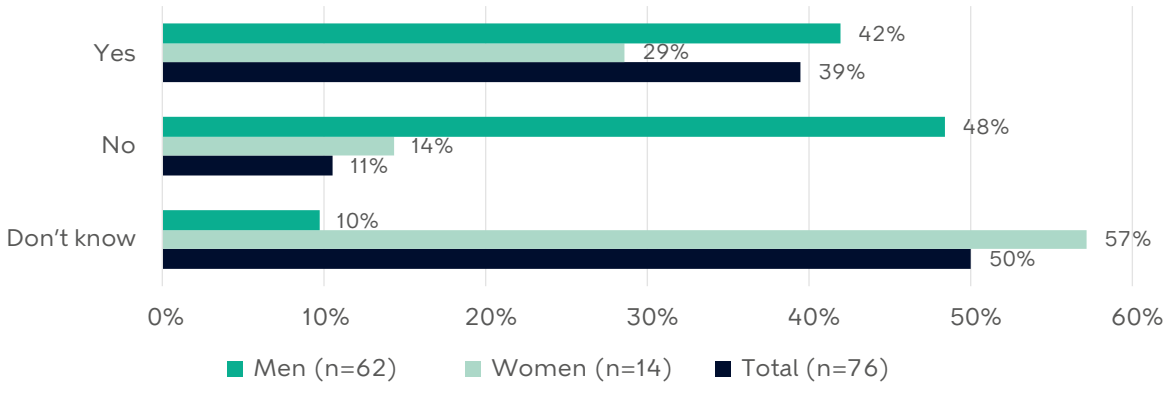


Cause of sexual problems

Figure 3.15 shows that four out of 10 citizens think that their sexual problems are due to diabetes. More men than women think their sexual problems are due to diabetes. One in 10 citizens do not think their sexual problems can be attributed to diabetes. Three times more men than women do not think their sexual problems are due to diabetes.

The percentage of women who answer 'don't know' is far higher than the percentage of men. Nearly six out of 10 women answer 'don't know' compared with one in 10 men.

Figure 3.15 *Are sexual problems due to diabetes?*



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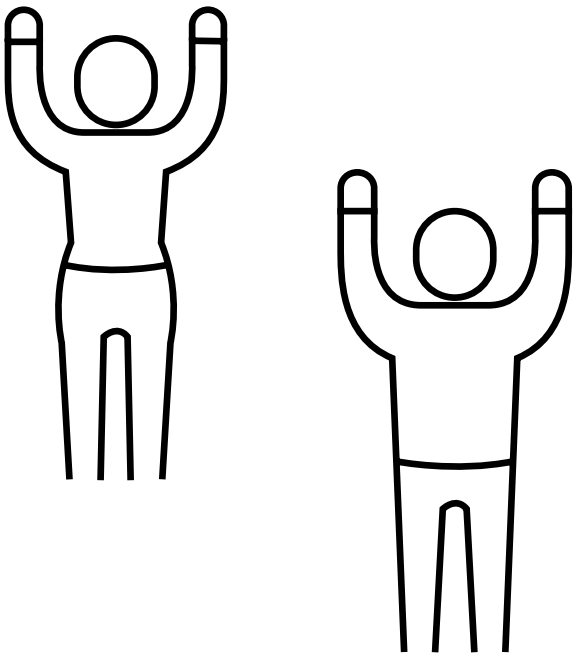


4

MENTAL HEALTH AND EVERYDAY LIFE WITH DIABETES

4 Mental health and everyday life with diabetes

- The proportion of citizens self-rating their health as 'good' or 'very good' increases from two out of five at the start of the rehabilitation programme to two out of three at the end. The increase is maintained six months later.
- At the start of the programme, 42% of citizens at the Centre for Diabetes show signs of diabetes distress. By the end of the programme, this percentage has halved, and the trend is maintained six months later.
- Compared with citizens who have 'good' or 'very good' self-rated health, citizens who have 'not very good' or 'poor' self-rated health are more frequently daily smokers and physically inactive, and often have problems sleeping.
- At the start of the programme, 43% of citizens feel confident in their ability to cope with their diabetes. Six months after the end of the programme, this has increased by 30 percentage points.
- At the start of the programme, 42% of citizens feel they are managing their diabetes. Six months after the end of the programme, this has increased by 36 percentage points.
- One in three citizens experience sometimes or often being alone although they would prefer to be with others.

Introduction

The vast majority of Danish citizens have good mental health. Figures from the Health Profile 2017 show, however, that 17% of Danes have 'not very good' or 'poor' self-rated health, and that 25% have a high stress level[1]. Annually, 2,400 Danes die as a result of poor mental health, which also causes 4,100 years of lost life among men and 1,900 years of lost life among women[1,2].

WHO defines mental health as "[...] a state of well-being that enables people to cope with the stresses of life, realize their abilities, [...] and contribute to their community"[3].

Many people with diabetes experience challenges with managing their condition on a day-to-day basis. Frequently reported problems include worry about the future and the possibility of serious complications. In particular, people with type 2 diabetes experience social and psychological consequences of life with diabetes, food- and meal-related limitations and overweight[4].

The consequences of the negative emotions impact mental health and should not be underestimated. This study deploys a number of tools designed to evaluate both general mental health problems (for example, the Five Well-being Index, WHO-5) and diabetes-specific problems (for example, the Problem Areas in Diabetes scale, PAID-5).

Social networks, support and relationships have an influence on health, and people with weak social relationships have higher morbidity and mortality compared with those with good social relationships. This is also true for people with diabetes[1,5]

This chapter describes citizens' mental health based on a range of parameters, including self-rated health, well-being, depression and diabetes distress, diabetes in everyday life and social relationships. It also describes mental health in combination with other risk factors.

4.1 Self-rated health and the experiencing of health problems

Self-rated health is a person's overall rating of their own health. This rating covers not just their current health situation, but also developments in their health throughout the course of their life, knowledge of morbidity and mortality in the family and an assessment of their own health status relative to their age peers. The self-rating of health can influence how the citizen responds to and manages the condition as well as their own preventive and health-promoting behaviour. The citizen's self-rated health is influenced by their experience of their own resources and the possibility of getting support and help from within their network in the event of illness, also called self-efficacy[6]. Self-rated health is a very strong predictor of death.

In addition to self-rated health, the citizens' health status is illuminated based on two items from the Health Education Impact Questionnaire (HeiQ).

The following questionnaire items provide the basis for this section:

- How would you rate your health overall? (SF-12)
- I'm limited in my daily activities because of my health (HeiQ)
- I think my life is really good, even though I have health problems (HeiQ)

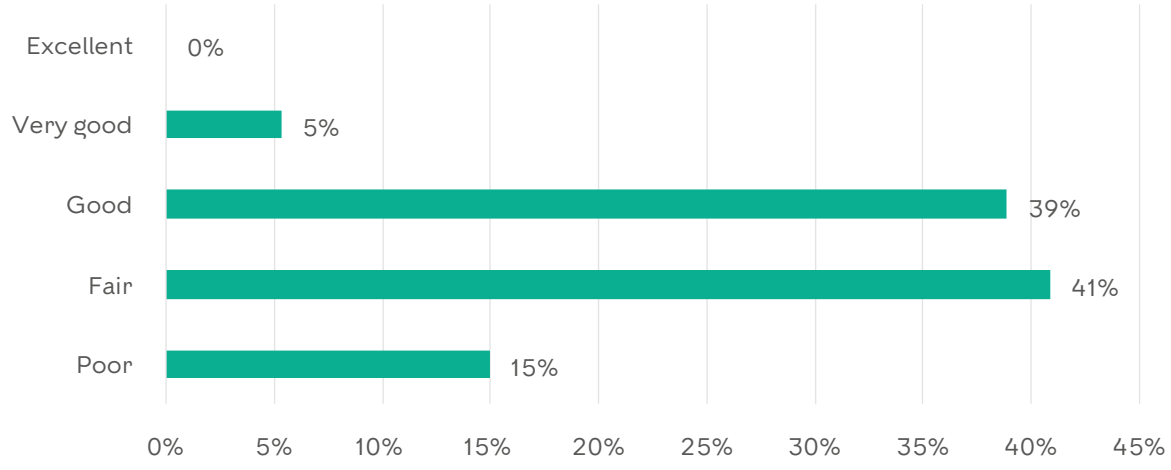
Self-rated health

The item 'How would you rate your health overall?' originates from the Short Form Health Survey (SF-12), which is a generic tool for self-rated health evaluation that measures health-related quality of life and functioning viewed from the patient's perspective[7].

Figure 4.1 shows self-rated health among citizens referred to the Centre for Diabetes. At the start of the rehabilitation programme, more than 50% of the citizens rate their health as 'fair' or 'poor'. By comparison, 39% of citizens with diabetes in the Capital Region of Denmark and the City of Copenhagen have 'fair' or 'poor' self-rated health[1,8].

At the start of the rehabilitation programme, two out of five citizens rate their health as 'good' and one in 20 as 'very good'.

Figure 4.1 *Self-rated health (n=301)*



Development

Figure 4.2 shows the development in self-rated health among citizens who took part in all three evaluations. By the end of the programme, there has been an improvement in self-rated health. Specifically, the percentage of citizens with 'excellent', 'very good' or 'good' self-rated health increases by 10 percentage points from the start to the end of the programme. Furthermore, the percentage of citizens with 'fair' or 'poor' self-rated health falls by just under 20 percentage points, with only one in three having 'fair' or 'poor' self-rated health by the end of the programme. These changes are maintained six months later.

Figure 4.3 shows the sociodemographic distribution of citizens with 'fair' or 'poor' self-rated health at the start of the rehabilitation programme.

Figure 4.2 *Development in self-rated health (n=117)*

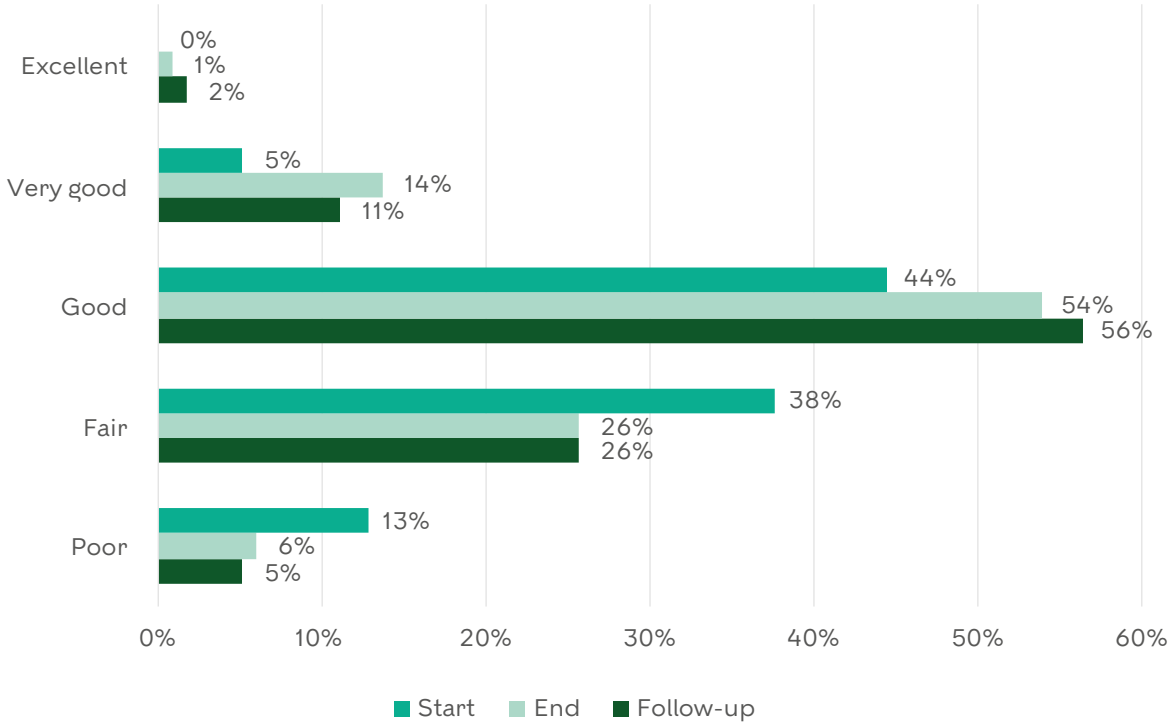
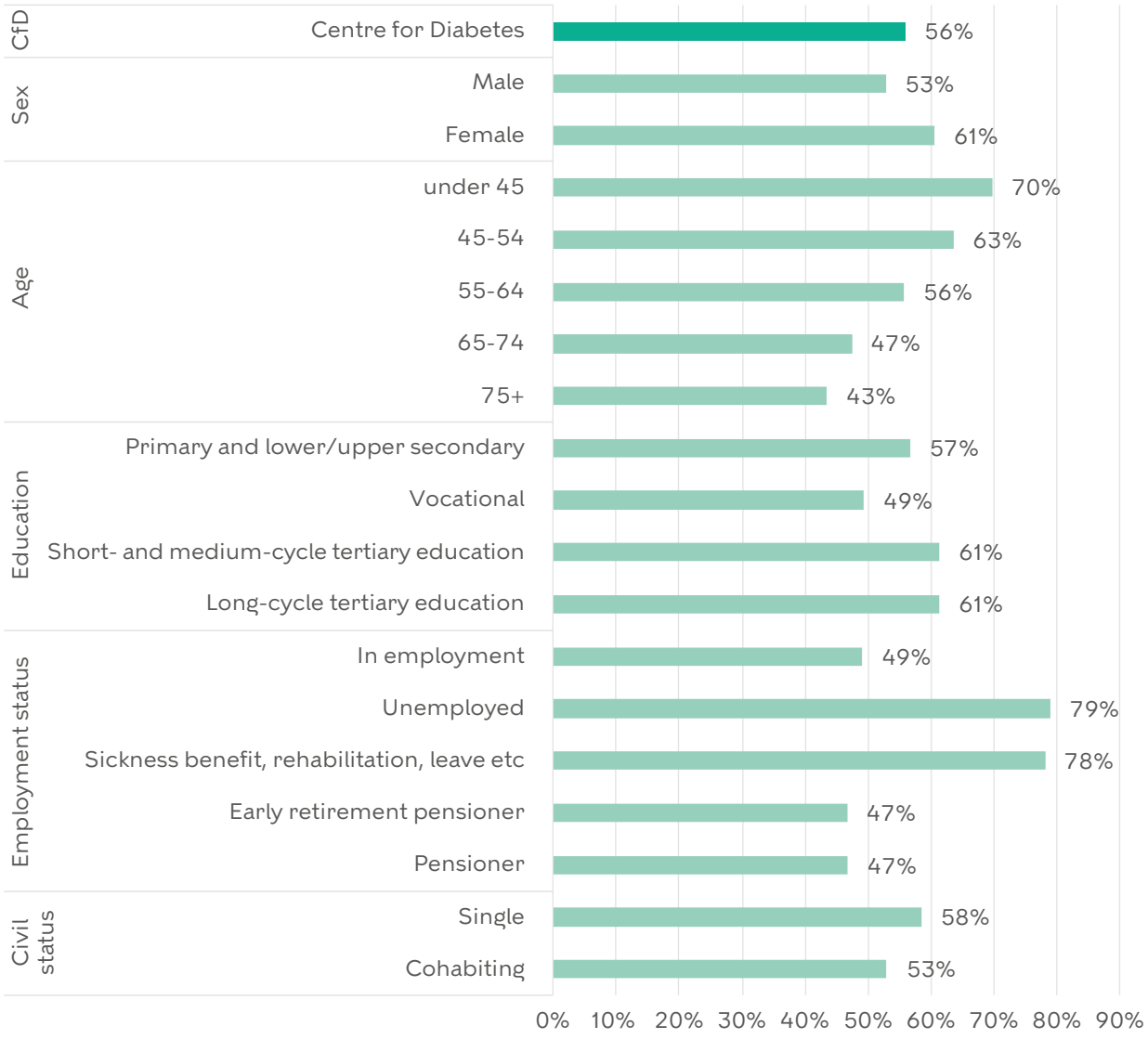


Figure 4.3 *'Fair' or 'poor' self-rated health*



Centre for Diabetes: At the start of the rehabilitation programme, 56% of citizens at the Centre for Diabetes have 'poor' or 'fair' self-rated health (hereinafter collectively referred to in this section as poor self-rated health).

Sex: At the start of the rehabilitation programme, slightly more women than men have poor self-rated health.

Age: Poor self-rated health decreases with increasing age. In the under-45 group, more than two-thirds of citizens have poor self-rated health. This falls to a little under half among citizens over the age of 65.

Education: There are small differences in the percentage of citizens with poor self-rated health across education groups. In all groups, apart from vocational, three out of four have poor self-rated health.

Employment status: The percentage of citizens with poor self-rated health is highest among those who are unemployed or in receipt of sickness benefit. In both groups, four out of five have poor self-rated health. Among those citizens in employment, early retirement pensioners and pensioners, just under half have poor self-rated health. The difference is statistically significant.

Civil status: Compared with cohabiting citizens, the percentage of single citizens with poor self-rated health is slightly higher.

Self-rated health combined with other risk factors

This section describes selected risk factors among citizens with 'fair' or 'poor' self-rated health compared with citizens with 'good' or 'very good' self-rated health.

The percentage of citizens who are daily smokers, physically inactive or have short/long sleep length is significantly higher among those with 'fair'/'poor' self-rated health compared with those with 'good'/'very good' self-rated health.

Table 4.4 *Incidence of selected risk factors among citizens with 'fair'/'poor' self-rated health and citizens with 'good'/'very good' self-rated health*

	'Fair'/'poor' self-rated health, %	'Good/'very good' self-rated health, %
Obesity (BMI ≥ 30)	69.1	62.3
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	25.6	16.3
Daily smoker	30.2*	16.8
Not meeting WHO's recommendations for physical activity	78.8*	61.8
Short/long sleep length	27.5*	11.7
Signs of high alcohol consumption	37.9	39.8

** Statistically significant between-groups difference.*

4.2 Well-being

Well-being is examined using the WHO-5 tool, which measures the level of positive psychological well-being and can be used as a measure of a person's general well-being or welfare irrespective of their condition.

The tool is often used in connection with pre- and post-evaluations of health and social interventions that are wholly or partly intended to improve citizens' well-being/mental health *(see Appendix 5)* [7].

The following questions provide the basis for this section: How have you felt in the last two weeks?

In the last two weeks....

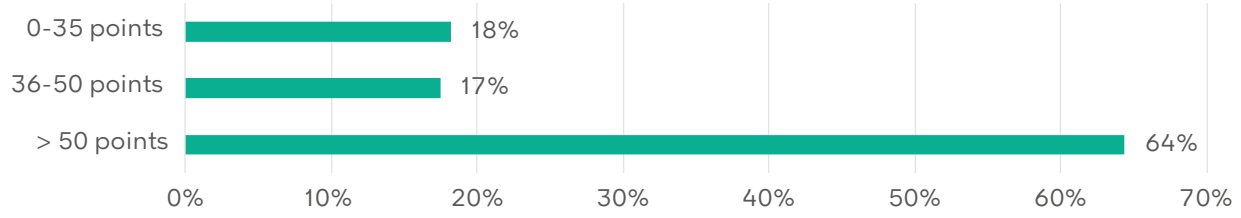
- I have felt cheerful and in good spirits.
- I have felt calm and relaxed.
- I have felt active and vigorous.
- I have woken up fresh and rested.
- My daily life has been filled with things that interest me.

Well-being

Figure 4.5 shows that at the start of the rehabilitation programme two out of three citizens score more than 50 points and thus have generally good well-being.

Just under one in five score 36-50 points, and almost the same percentage score 0-35 points, indicating poor well-being and consequently a risk of depression and stress.

Figure 4.5 *Citizens' well-being (n=275)*



Development

Figure 4.6 shows the development in well-being among citizens who took part in all three evaluations. Generally, well-being improves through the course of the programme. By the end of the rehabilitation programme, the percentage of citizens scoring more than 50 points has increased by 10 percentage points and the percentage scoring 36-50 and 0-35 points respectively has fallen. These improvements are maintained from the end of the programme to the six-month follow-up, though a small increase is evident in the percentage of citizens with a very low score (0-35 points).

Figure 4.6 *Development in citizens' well-being (n=103)*

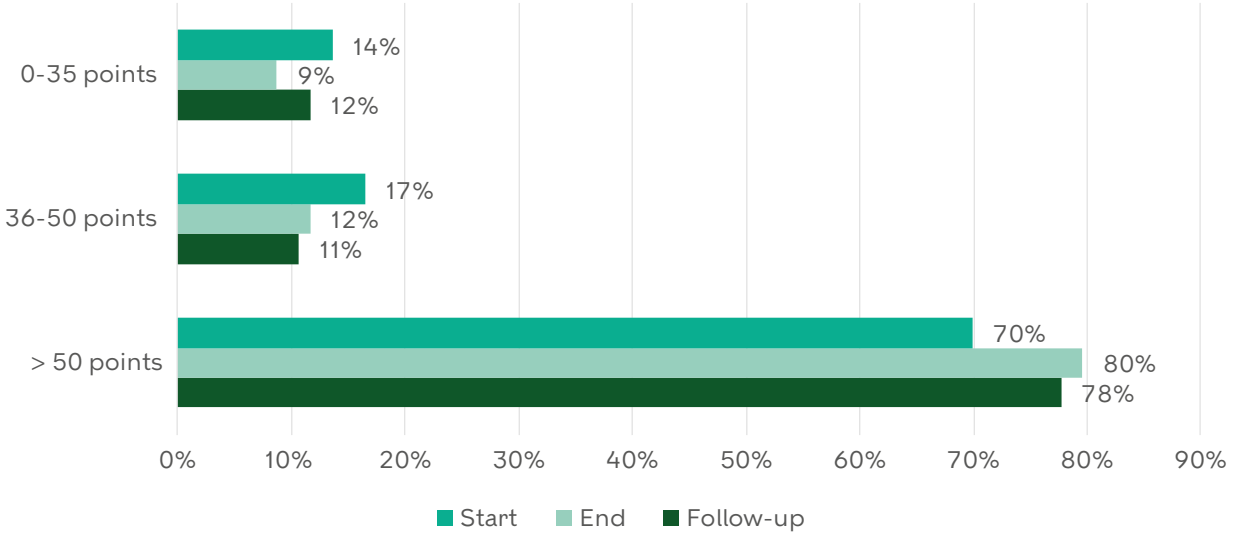


Table 4.7 shows that the average WHO-5 score among all citizens at the start of the programme is 57.2. This is lower than the general population average of 68. It is also seen that the average WHO-5 score increases from the start of the programme to the end of the programme but falls again by the final evaluation six months later.

Table 4.7 *Average WHO-5 score from the start of the rehabilitation programme to the final evaluation*

	Start	Start	End	Follow-up	Δstart-end	Δstart-follow-up	Δend-follow-up
n	275	103	103	103	107	112	112
WHO-5, avg (95% CI)	57.2 (54.5;60.0)	61.6 (57.2;66.0)	66.1 (62.0;70.2)	62.4 (58.1;66.7)	4.6* (1.4;7.9)	1.4 (-1.9;4.6)	-3.6** (-6.8;-0.4)

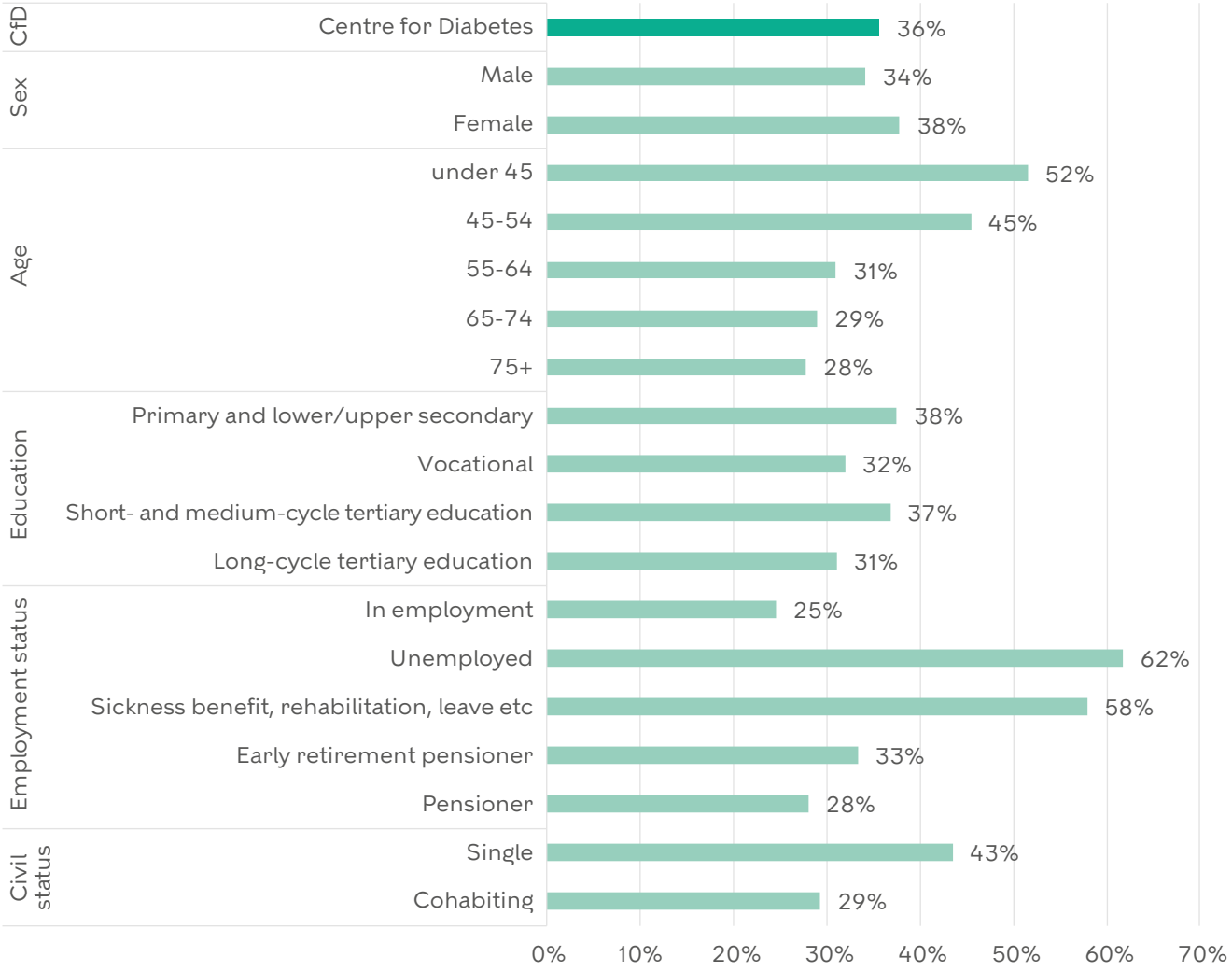
Scale 0-100.

** Wilcoxon signed rank test p=0.003.*

*** p=0.039.*

Figure 4.8 shows the sociodemographic distribution of citizens scoring fewer than 50 points on WHO-5 at the start of the rehabilitation programme.

Figure 4.8 *Citizens with WHO-5 score < 50*



Centre for Diabetes: 36% of citizens have a WHO-5 score < 50 at the start of the rehabilitation programme, which indicates they are at risk or significant risk of depression or stress.

Sex: Slightly more women than men have a low score.

Age: The percentage of citizens with a low score decreases with increasing age. Around half of citizens under the age of 55 have a low score, and hence signs of depression and stress, whereas only one in three citizens in the over-55 age group have a low score.

Education: There is no social gradient in relation to risk of depression or stress, where the figure is slightly more than one in three citizens across all education categories.

Employment status: The percentage of citizens with a low WHO-5 score is twice as high among unemployed citizens and those in receipt of sickness benefit compared with those in employment, early retirement pensioners or pensioners. The differences are statistically significant.

Civil status: The proportion of citizens with a low WHO-5 score is two out of five among single citizens and one in three among cohabiting citizens. The difference is statistically significant.

4.3 Diabetes distress

Diabetes distress is widespread among people with type 2 diabetes[9]. The term encompasses emotional responses to living with diabetes, the increased burden associated with the constant requirements for managing the condition in everyday life and worry about diabetes comorbidities. Diabetes distress can occur as a result of social consequences of diabetes (for example, stigmatisation, discrimination or coping with the outside world's reactions and lack of understanding) and economic consequences of diabetes (for example, treatment costs). Diabetes distress can vary over time and can be exacerbated during highly challenging periods[4].

Problem Areas in Diabetes (PAID) is a screening tool for identifying diabetes distress. It focuses on psychosocial problems in people with diabetes and is validated in a large number of language versions, including Danish[7,10].

The full PAID questionnaire comprises 20 items, but it is possible to use a shortened version, either PAID-5, comprising five selected items (nos 3, 6, 12, 16 and 19), or PAID-1, comprising just one selected item (no 12)[9]. This study used the two shortened versions (see below). Responses are scored from 0 (not a problem) to 4 (serious problem). The scores are added together, giving a total score of 0–20 points. A score ≥ 8 indicates possible diabetes distress[7].

The following questionnaire items provide the basis for this section:

PAID-1

- Worrying about the future and the possibility of serious complications

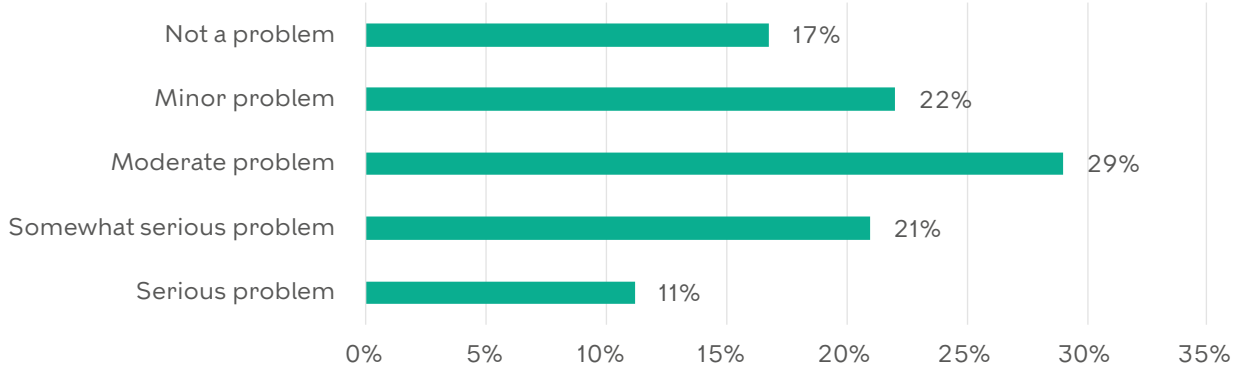
PAID-5

- Feeling scared when you think about living with diabetes
- Feeling depressed when you think about living with diabetes
- Worrying about the future and the possibility of serious complications
- Feeling that diabetes is taking up too much of your mental and physical energy every day
- Coping with complications of diabetes

Worrying about the future and the possibility of serious complications

Figure 4.9 shows that, at the start of the rehabilitation programme, worrying about the future and the possibility of serious complications is 'not a problem' or only a 'minor problem' among four out of 10 citizens. One in three citizens regard this as a 'moderate problem' and one in three as a 'somewhat serious' or 'serious' problem.

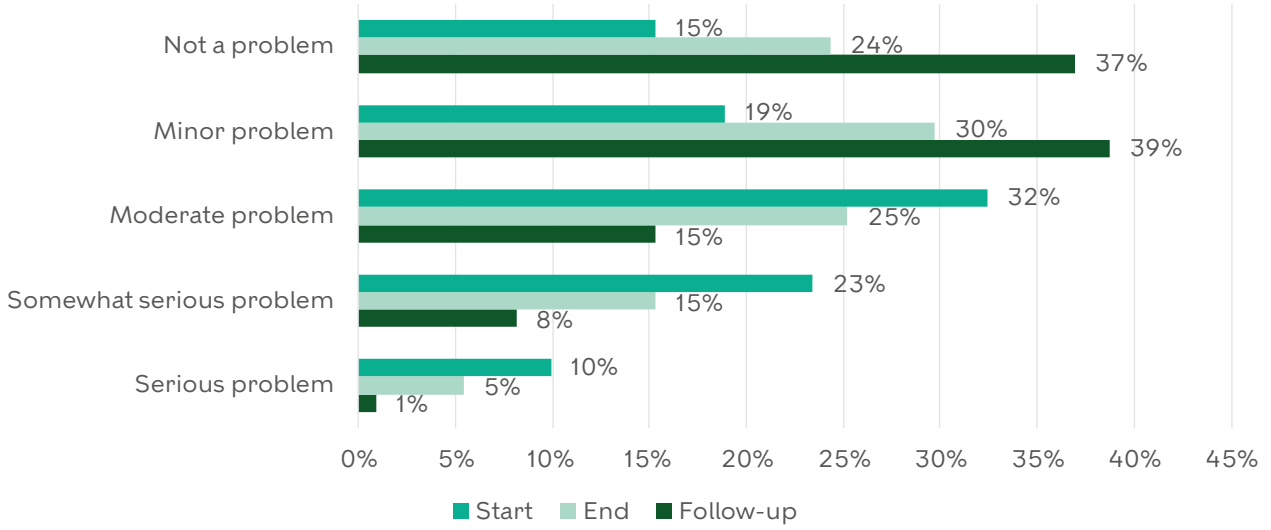
Figure 4.9 *Worrying about the future and the possibility of serious complications (n=286)*



Development

Figure 4.10 shows the development in worrying about the future and the possibility of serious complications among citizens who took part in all three evaluations. By the end of the rehabilitation programme, citizens are significantly less worried in relation to the future and the possibility of serious complications. Specifically, the percentage of citizens who do not see any problems, or only minor problems, in relation to the future and the possibility of complications increases by 20 percentage points (from 34% to 54%). The change is even more significant six months after the end of the programme, with 77% regarding worrying about the future and the possibility of serious complications as a 'minor problem' or 'not a problem'. Similarly, there is a significant decrease in the percentage of citizens experiencing worrying about the future and the possibility of complications as a 'moderate'/'somewhat serious'/'serious' problem.

Figure 4.10 *Worrying about the future and the possibility of serious complications (n=111)*



Distribution of citizens in relation to diabetes distress

Figure 4.11 shows the distribution in relation to diabetes distress among citizens who took part in all three evaluations. A PAID-5 score < 8 indicates no or low risk of diabetes distress, while a score of ≥ 8 indicates possible diabetes distress.

At the start of the rehabilitation programme, just over half of the citizens do not have diabetes distress. By the end of the programme, the percentage of citizens at low risk has increased, and six months later this development has continued, with almost three out of four citizens having a score that indicates low risk of diabetes distress.

At the start of the rehabilitation programme, just under half (47%) of the citizens have signs of diabetes distress. A declining trend is evident, with just one in four citizens having signs of diabetes distress six months after the end of the programme. By comparison, a meta analysis shows that in European studies around one in three citizens have diabetes distress[9].

Figure 4.12 shows the sociodemographic distribution of citizens with diabetes distress with a PAID-5 score of ≥ 8.

Figure 4.11 *Distribution of citizens in relation to diabetes distress (n=103)*

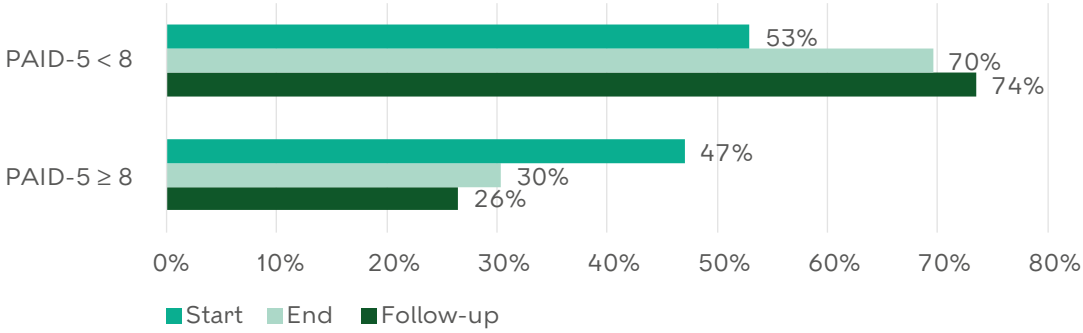
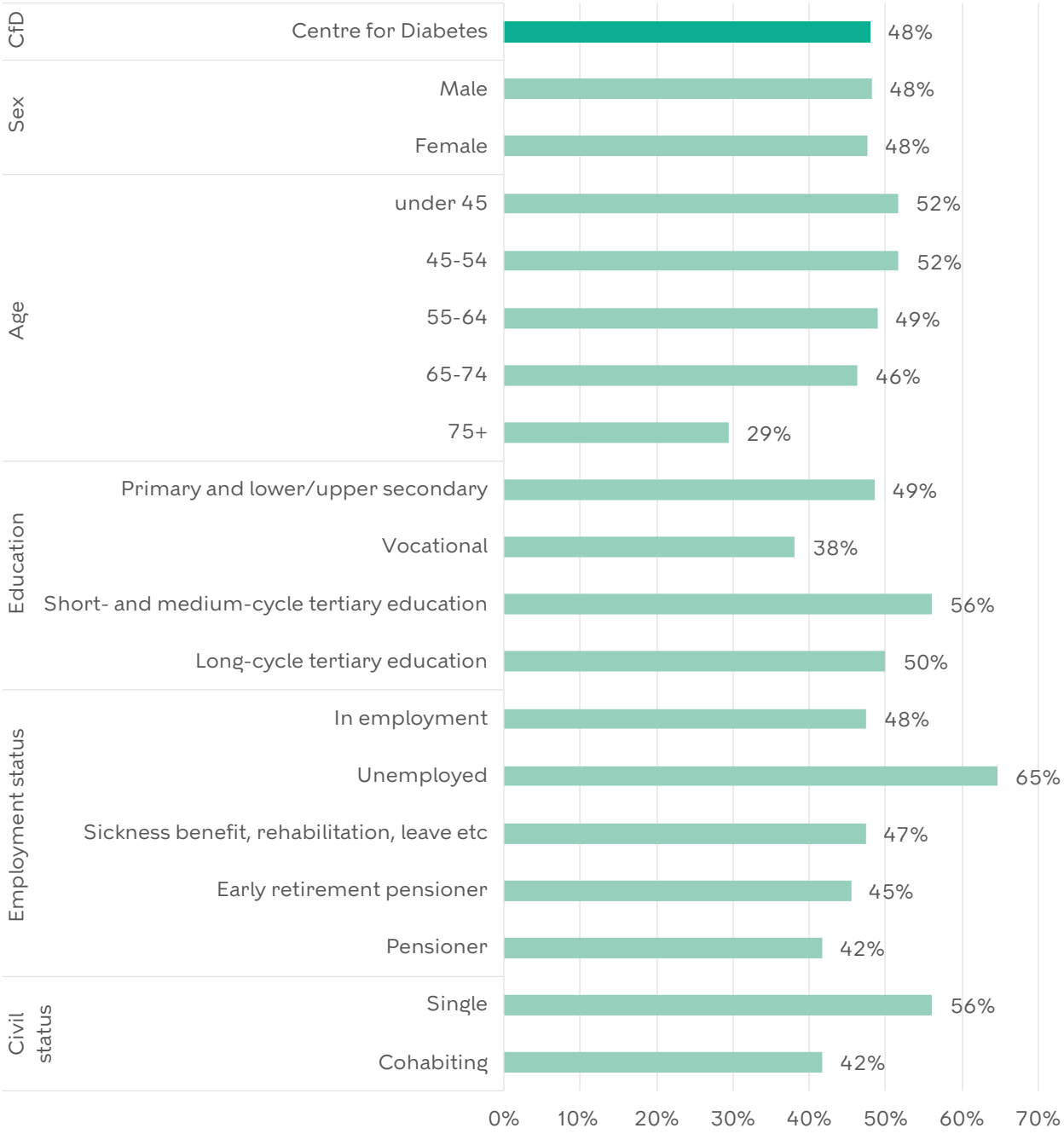


Figure 4.12 *Distribution of citizens with diabetes distress (PAID-5)*



Centre for Diabetes: Almost half of the citizens have diabetes distress.

Sex: An equal percentage of men and women have diabetes distress.

Age: There is no difference in the distribution of diabetes distress across age groups, with the exception of the 75+ group, where the risk is significantly lower.

Education: The percentage of citizens with diabetes distress varies only slightly across education categories, with the exception of the vocational group, where the figure is lower.

Employment status: The percentage of citizens with diabetes distress is highest among unemployed citizens, of whom two out of three have diabetes distress. In the other groups, the percentage is almost 50%.

Civil status: More single citizens than cohabiting citizens have diabetes distress. The difference is statistically significant.

4.4 Diabetes distress and depression

Diabetes distress and depression are differentiated in that diabetes distress is the emotional and psychological responses to life with diabetes, while depression is a separate diagnosis characterised by a more general despondency. However, depression is more frequent in citizens with diabetes and there is a close correlation between diabetes distress and depression[11]. Researchers such as Snoek et al[12] and Skinner et al have categorised and described a distribution of citizens with type 2 diabetes with and without diabetes distress and depression *(see Fig. 4.13)*[11].

Figure 4.13 *Distribution of diabetes distress and depression based on multiple epidemiological studies, Skinner et al.*

No depression **No diabetes distress** 50-70%	**Depression** **No diabetes distress** 5-10%
No depression **Diabetes distress** 20-30%	**Depression** **Diabetes distress** 5-10%

In this section, diabetes distress is defined based on a Paid-5 score ≥ 8 *(see section 4.3)* and depression is self-reported.

The following questionnaire item provides the basis for this section:

- Has your doctor told you that you have depression?

From Figure 4.14, it is evident that the percentage of citizens with diabetes distress but not depression at the start of the rehabilitation programme at the Centre for Diabetes is higher than found in the international literature *(see Fig. 4.13)*. 42% of the citizens have diabetes distress but not depression at the start of the rehabilitation programme. At the same time, it can be seen that the incidence of depression with and without diabetes distress is comparable with international studies, where the rates are 4% and 9% respectively.

By the end of the programme, the percentage of citizens with diabetes distress and not depression has halved, and this is maintained six months after the end of the programme. This is a statistically significant difference. No significant changes are seen in the categories where the citizens also have depression.

Figure 4.14 *Distribution of diabetes distress and depression among citizens at the Centre for Diabetes at the start and end of the programme and at a six-month follow-up (n=90)*

No depression **No diabetes distress** **Start: 44%** **End: 64%** **Follow-up:: 64%**	**Depression** **No diabetes distress** **Start: 9%** **End: 8%** **Follow-up:: 9%**
No depression **Diabetes distress** **Start: 42%** **End: 22%** **Follow-up:: 20%**	**Depression** **Diabetes distress** **Start:4%** **End: 6%** **Follow-up:: 7%**

4.5 Experience of everyday life with health problems

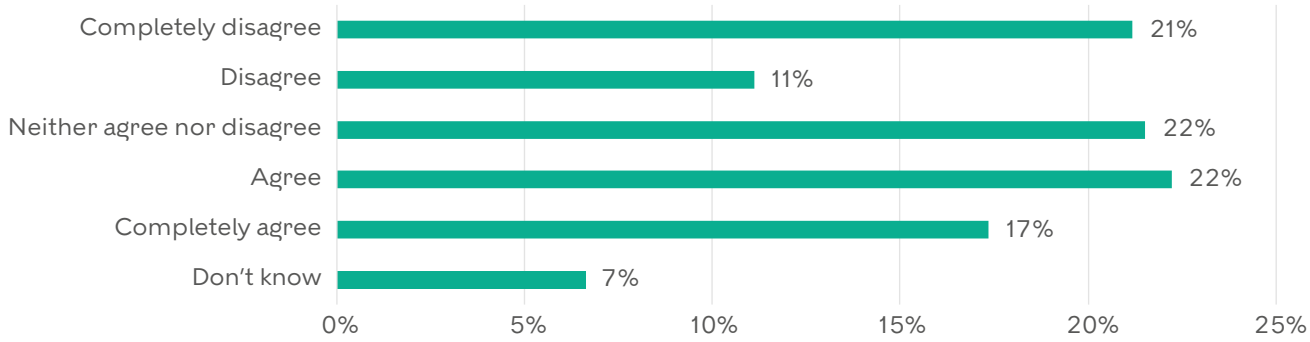
The study covers citizens' experience of everyday life with chronic disease. The questionnaire items shedding light on this originate from the Health Education Impact Questionnaire (HeiQ), a tool addressing everyday life with chronic disease designed for use in patient education and interventions focused on coping[7,13].

The following questionnaire items provide the basis for this section:

- I'm limited in my daily activities because of my health
- I think my life is really good, even though I have health problems

Figure 4.15 shows that at the start of the rehabilitation programme at the Centre for Diabetes one in three of all citizens do not feel that their health limits their daily activities. Two out of five feel that they are limited in their daily activities because of their health.

Figure 4.15 *Limited in daily activities because of health (n=288)*



Development

Figure 4.16 shows the development among citizens who took part in all three evaluations in whether they feel limited in their daily activities because of their health. The percentage of citizens who feel limited decreases from the start to the end of the programme and is maintained six months later. Overall, fewer citizens feel limited in their daily activities after the rehabilitation programme compared with at the start.

Figure 4.16 *Development in limitation on daily activities because of health (n=112)*

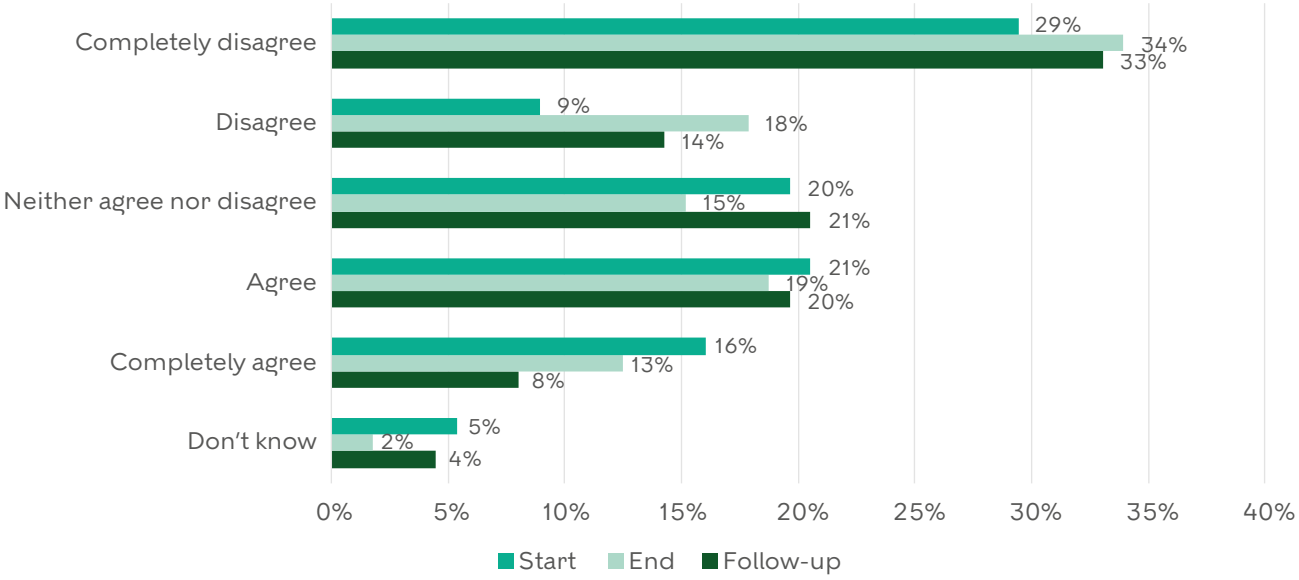
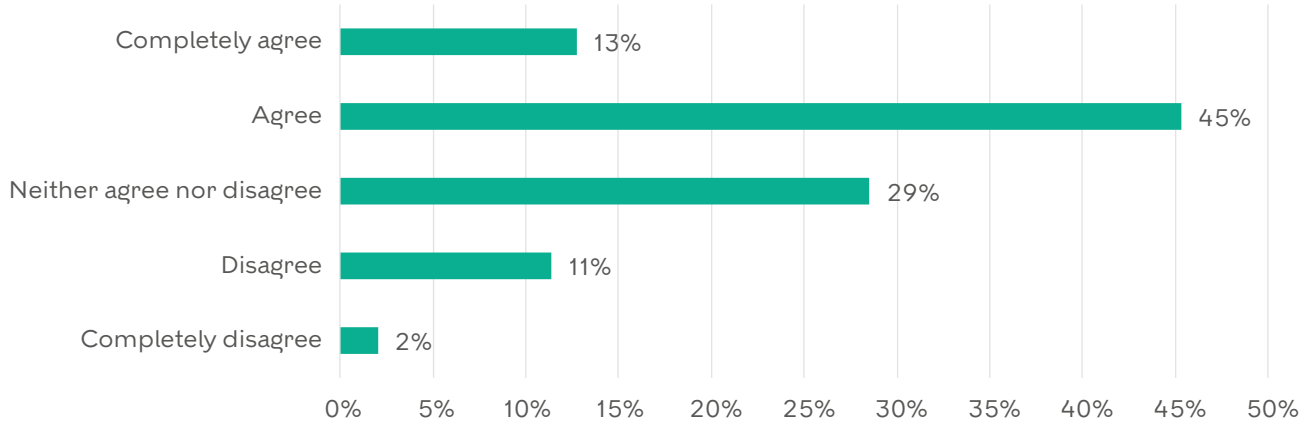


Figure 4.17 shows that at the start of the rehabilitation programme six out of 10 citizens think their life is good, even though they have health problems. Slightly more than one in 10 disagree with the statement.

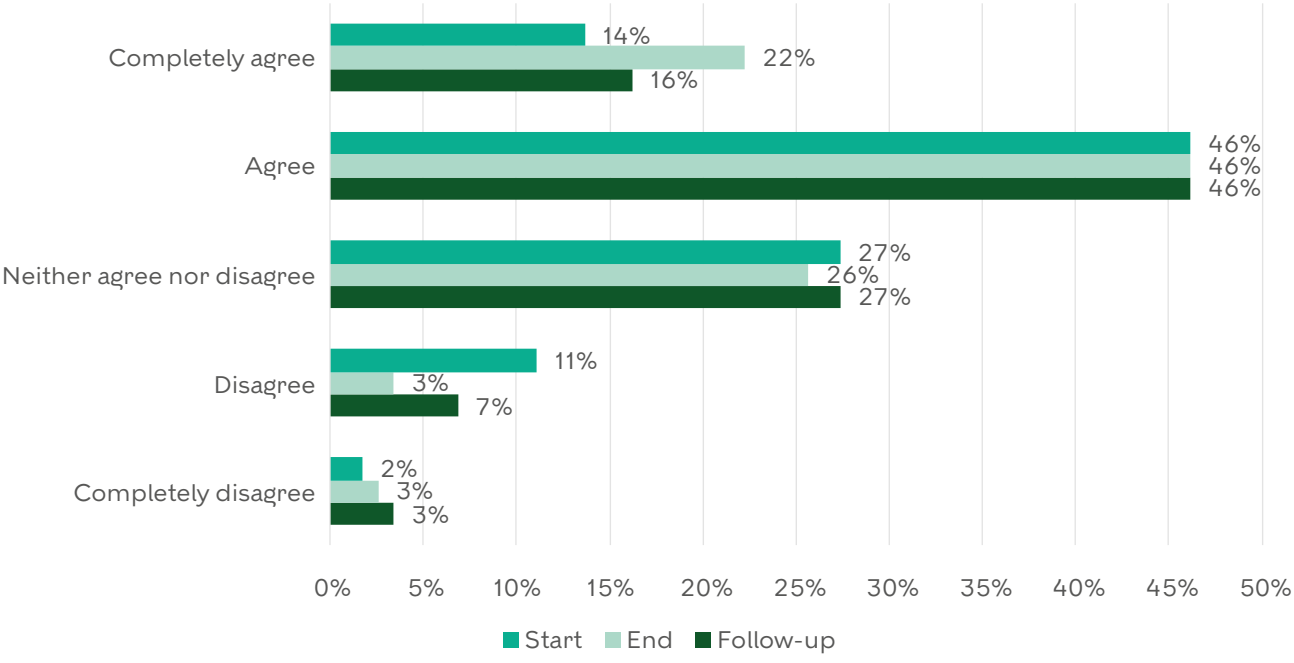
Figure 4.17 *Life with health problems (n=298)*



Development

Figure 4.18 shows the development among citizens who took part in all three evaluations in whether they think their life is good, even though they have health problems. By the end of the programme, the percentage of citizens who think their life is good has increased to seven out of 10. Six months later, there has been a slight decrease in this figure.

Figure 4.18 *Development in life with health problems (n=117)*



4.5 Management of diabetes on a day-to-day basis

"The purpose of rehabilitation is [to enable] a meaningful life with the best possible activity and participation, coping and quality of life [...]. Rehabilitation interventions are goal-oriented, interconnected and knowledge-based and the focus is on the person's perspectives and overall life situation"[14].

This section describes citizens' own perception of, and confidence in, their competence to look after and manage their diabetes on a day-to-day basis. The description takes as its starting point the Perceived Competence for Diabetes (PCD) questionnaire.

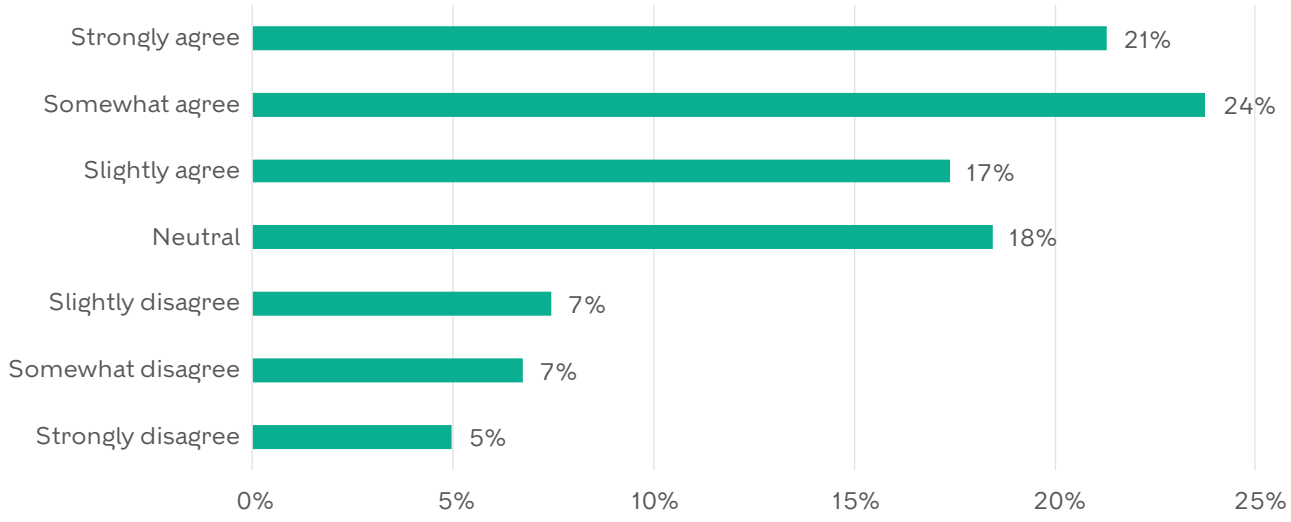
The basis is a five-item version. Each item is scored on a scale from 1 (strongly disagree) to 7 (strongly agree). The citizens rate their competence to manage diabetes. A low score indicates that the citizen may have a low level of self-care[15].

The following questionnaire items provide the basis for this section:

- I'm confident in my ability to cope with my diabetes.
- I feel able to manage my diabetes now.
- I'm able to handle the routine management of my diabetes.
- I'm able to meet the challenge of controlling my diabetes.
- I feel comfortable discussing my diabetes with my doctor/nurse.

Figure 4.19 shows that at the start of the rehabilitation programme almost half of the citizens feel confident in their ability to cope with their diabetes. Feeling confident encompasses citizens who indicated 'somewhat agree' and 'strongly agree'. Around one in 10 citizens do not feel confident in their ability to cope with diabetes. Feeling not confident encompasses citizens who indicated 'somewhat disagree' and 'strongly disagree'. Four out of 10 answer 'neutral'.

Figure 4.19 *Confidence in ability to cope with diabetes (n=282)*



Development

Figure 4.20 shows the development among citizens who took part in all three evaluations in their feeling of confidence in coping with their diabetes. By the end of the rehabilitation programme, there is an evident increase, with seven out of 10 of all citizens feeling confident in their ability to cope with their diabetes. This is largely unchanged six months later.

By the end of the programme, the proportion of citizens who do not feel confident in their ability to cope with their diabetes has decreased to one in 10, and by six months later there is a further small decrease.

Figure 4.20 *Development in confidence in ability to cope with diabetes (n=110)*

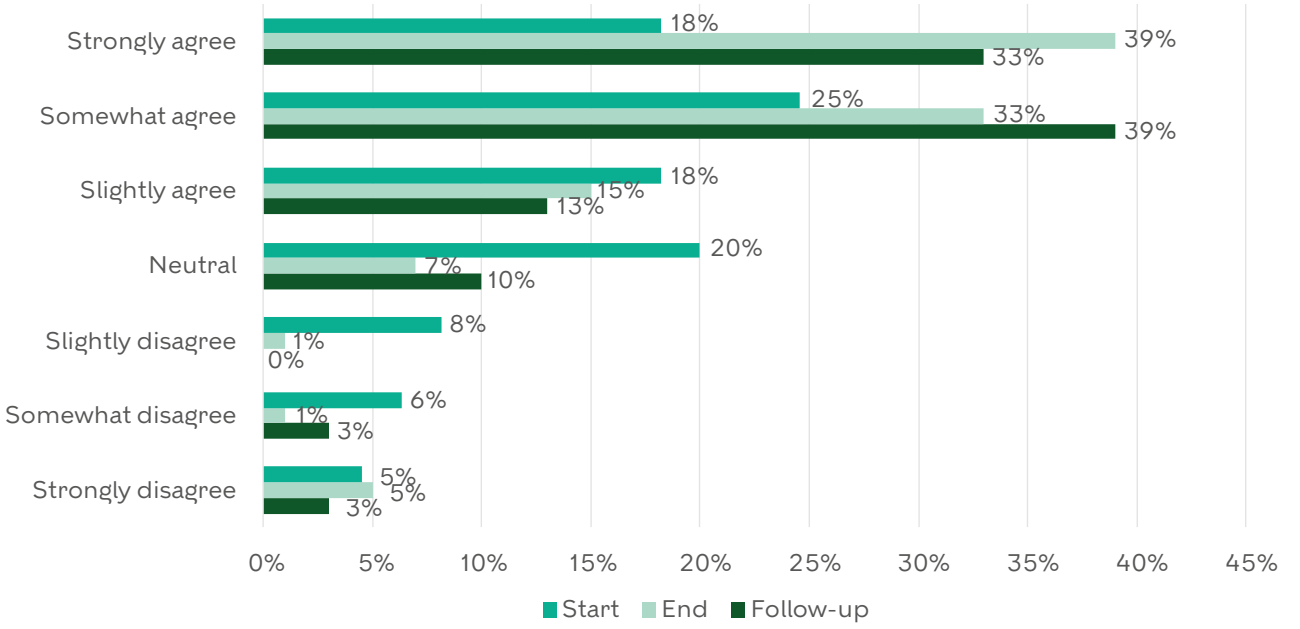
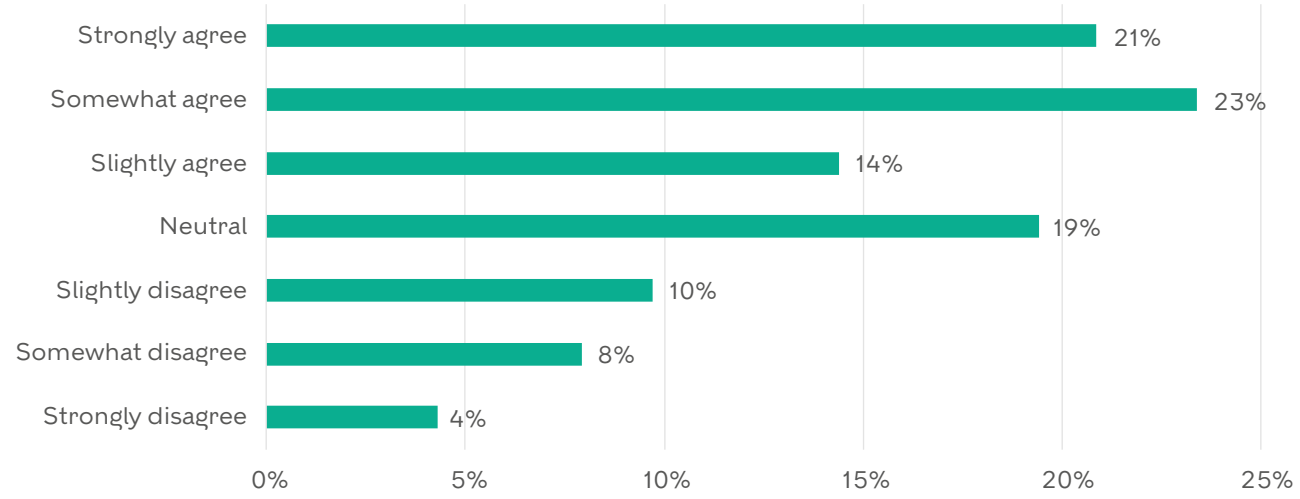


Figure 4.21 shows that at the start of the rehabilitation programme almost half of the citizens feel able to manage their diabetes. Slightly more than one in 10 do not feel able to manage their diabetes. Four out of 10 answer 'neutral'.

Figure 4.21 *Able to manage diabetes now (n=278)*



Development

Figure 4.22 shows the development among citizens who took part in all three evaluations in their perception of being able to manage their diabetes. The development is significant, with eight out of 10 citizens feeling able to manage their diabetes by the end of the programme. The development is maintained six months later.

Just one in 20 citizens do not feel able to manage their diabetes by the end of the programme. The proportion of citizens answering 'neutral' has decreased to one in five by the end of the programme and has decreased further six months later.

Figure 4.22 *Development – Able to manage diabetes now (n=108)*

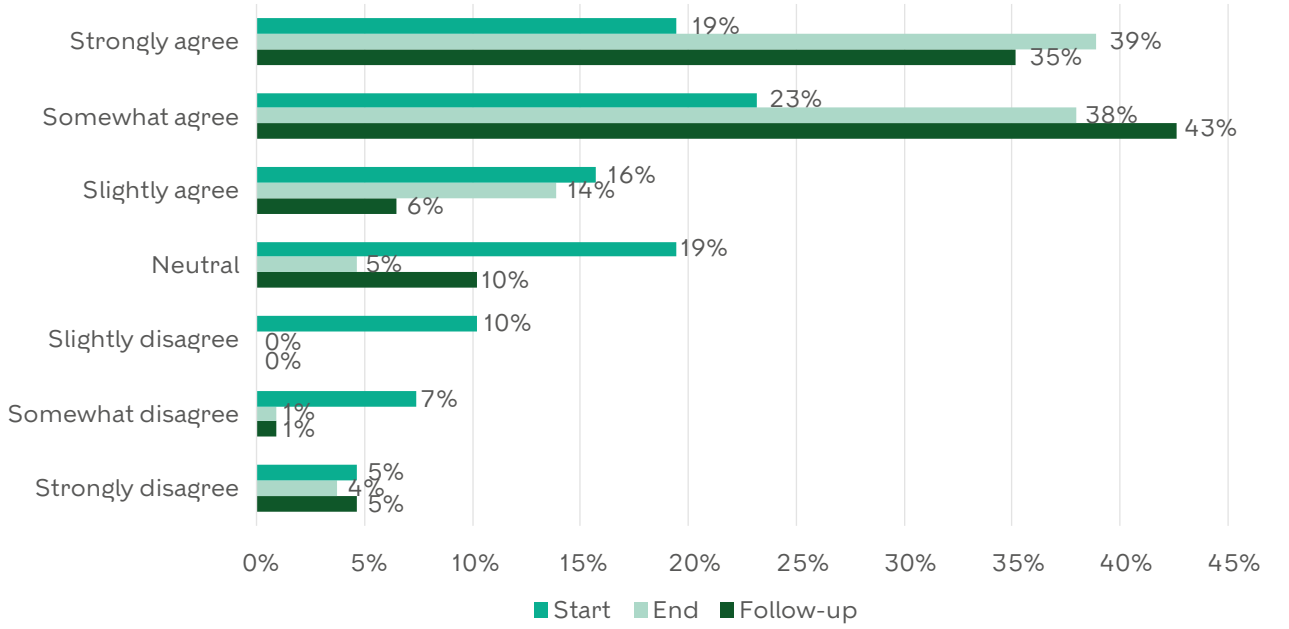
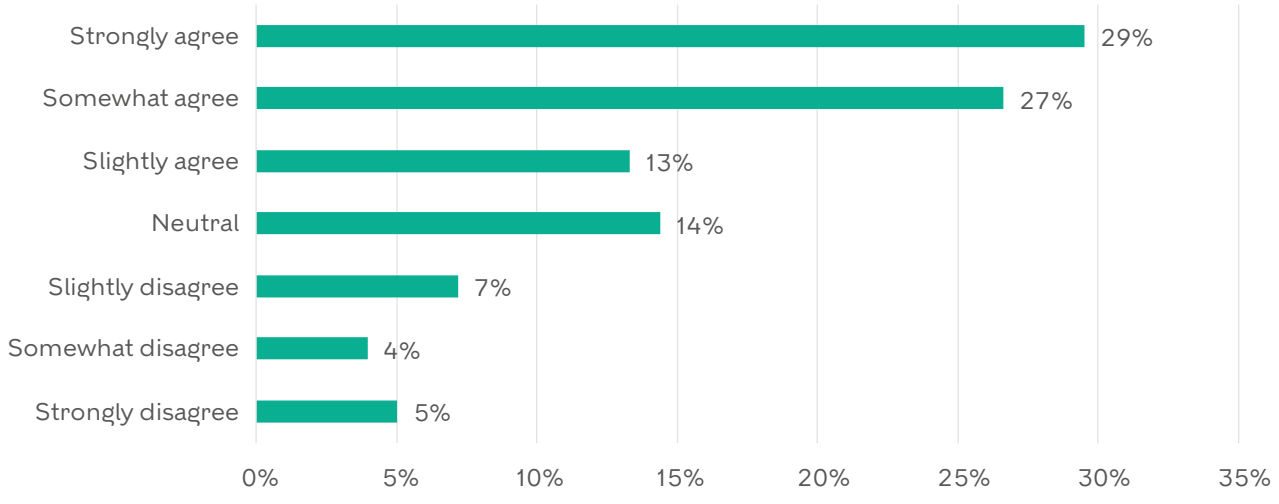


Figure 4.23 shows that at the start of the rehabilitation programme slightly more than half of the citizens feel they are able to handle the routine management of their diabetes. Fewer than one in 10 citizens do not think they are able to handle the routine management of their diabetes. One in three citizens answer 'neutral'.

Figure 4.23 *Routine management of diabetes (n=278)*



Development

Figure 4.24 shows the development among citizens who took part in all three evaluations in their perception of being able to handle the routine management of their diabetes. By the end of the programme, there has been an increase, with four out of five citizens perceiving that they can manage their diabetes. This level is maintained six months later. By the end of the programme and at the six-month follow-up, very few citizens perceive that they are not able to handle the routine management of their diabetes.

Figure 4.24 *Development in routine management of diabetes (n=107)*

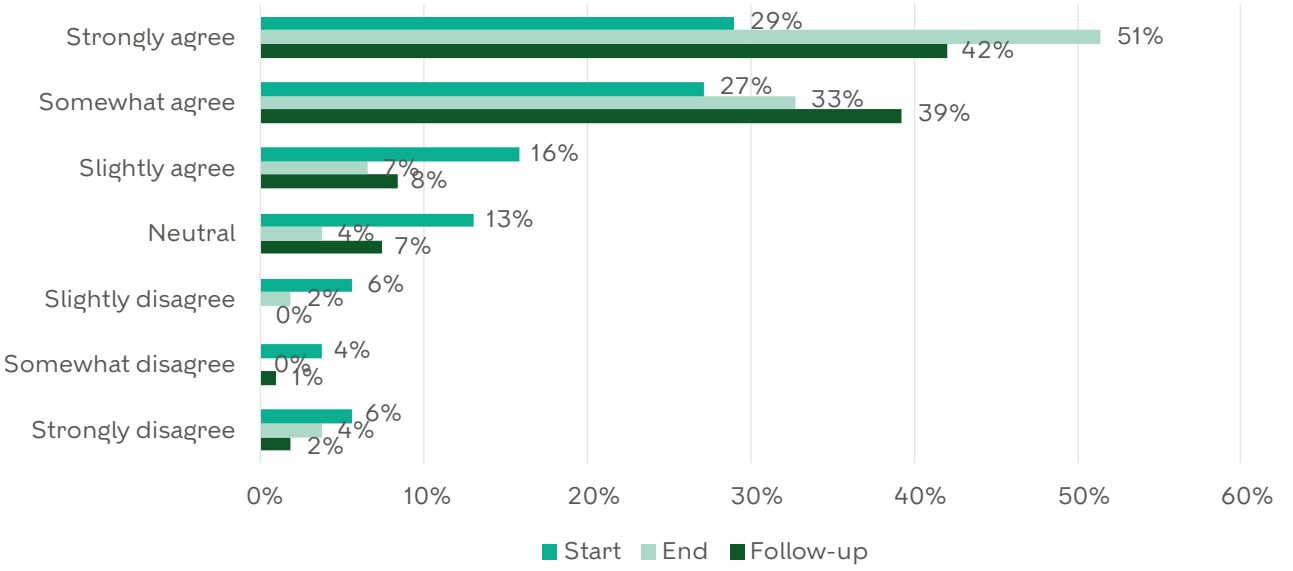


Table 4.25 combines the questionnaire statement 'I'm able to handle the routine management of my diabetes' with citizens' HbA_{1c} value at the start of the rehabilitation programme. HbA_{1c} decreases with the degree of agreement with the statement; in other words, the more that citizens perceive themselves able to handle the routine management of their diabetes, the lower the HbA_{1c}. However, citizens who answer 'neutral' have the lowest HbA_{1c}.

Table 4.25 *Responses to the statement 'I'm able to handle the routine management of my diabetes' together with citizens' HbA_{1c}.*

I'm able to handle the routine management of my diabetes	HbA_{1c} (mmol/mol)
Strongly disagree	63.1
Somewhat disagree	63.2
Slightly disagree	60.9
Neutral	54.6
Slightly agree	58.2
Somewhat agree	56.8
Strongly agree	55.0

Figure 4.26 shows that at the start of the rehabilitation programme three out of five citizens feel able to meet the challenge of controlling their diabetes. By the end of the programme, this has increased to more than seven out of 10.

Just under one in 10 citizens do not feel able to meet the challenge of controlling their diabetes.

Figure 4.26 *Able to meet the challenge of controlling diabetes (n=275)*

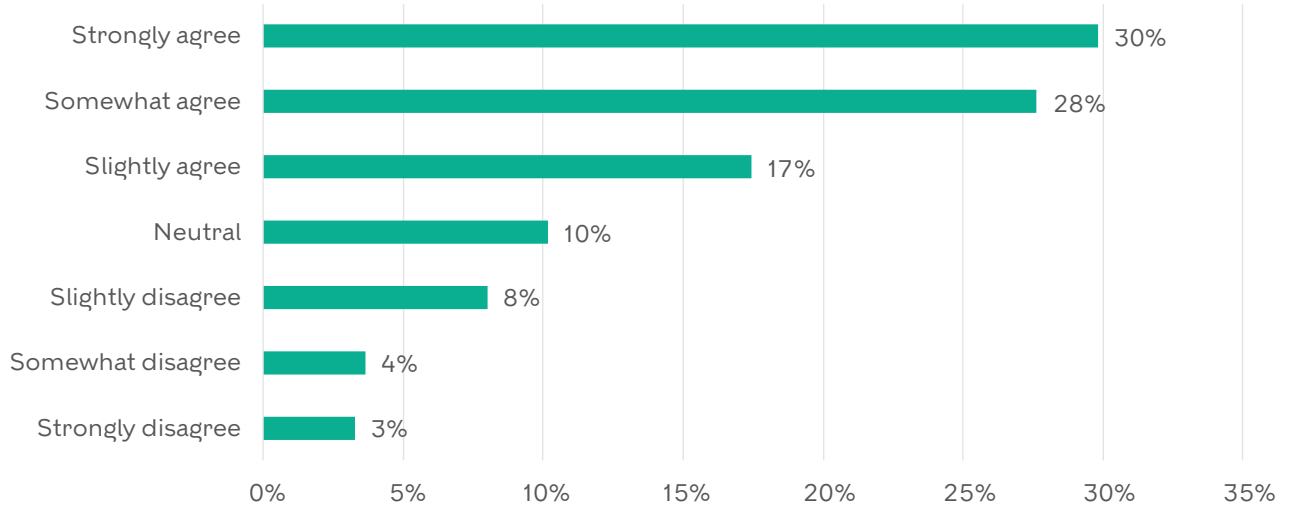


Figure 4.27 shows the development among citizens who took part in all three evaluations in their perception of being able to meet the challenge of controlling their diabetes. By the end of the programme, significantly more citizens perceive themselves able to meet the challenge of controlling their diabetes, with more than eight out of 10 indicating 'strongly agree' or 'somewhat agree'. By the six-month follow-up, this proportion has slightly decreased.

Figure 4.27 *Development – Able to meet the challenge of controlling diabetes (n=107)*

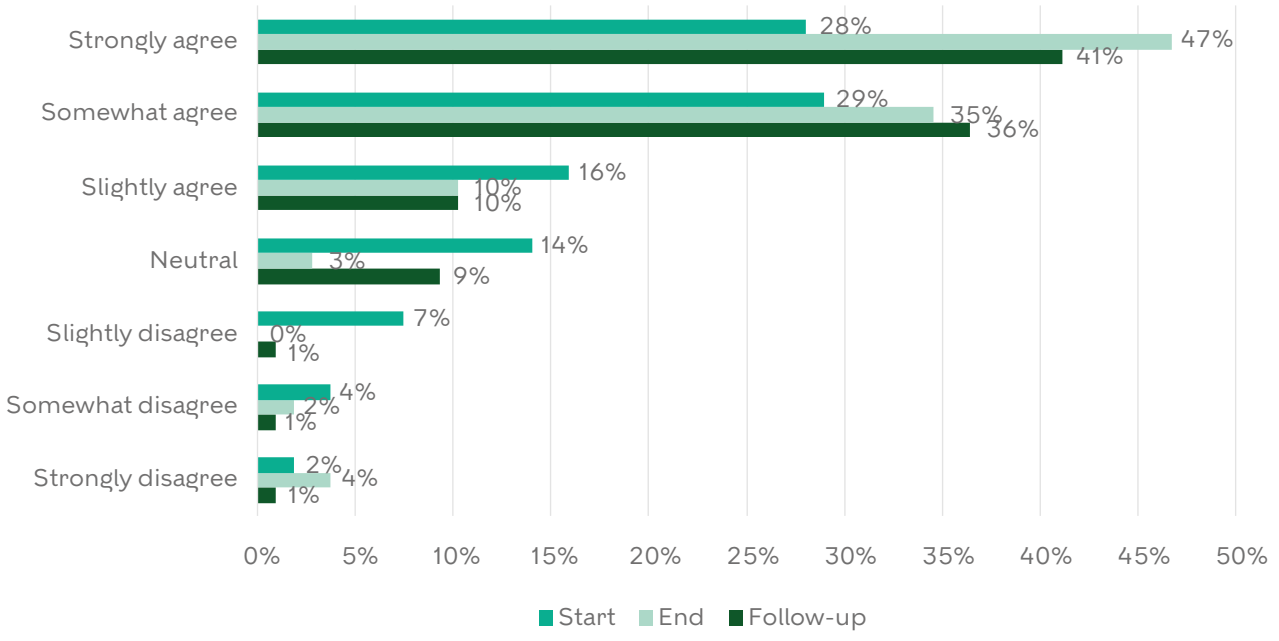
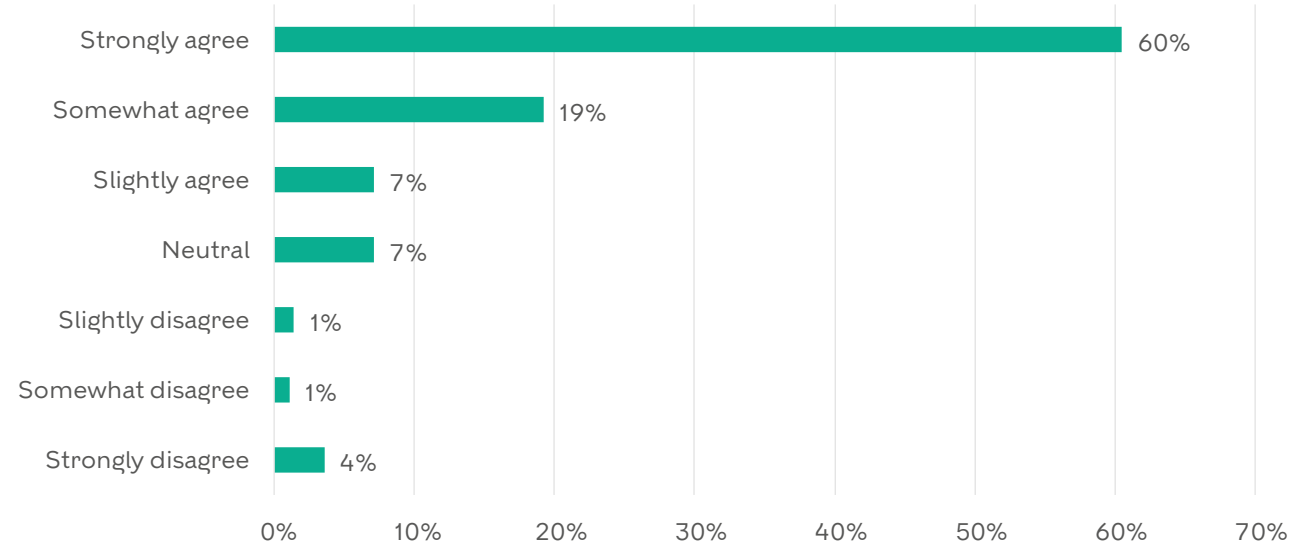


Figure 4.28 shows that at the start of the rehabilitation programme four out of five citizens feel comfortable discussing their diabetes with their doctor/nurse. One in 20 do not feel comfortable.

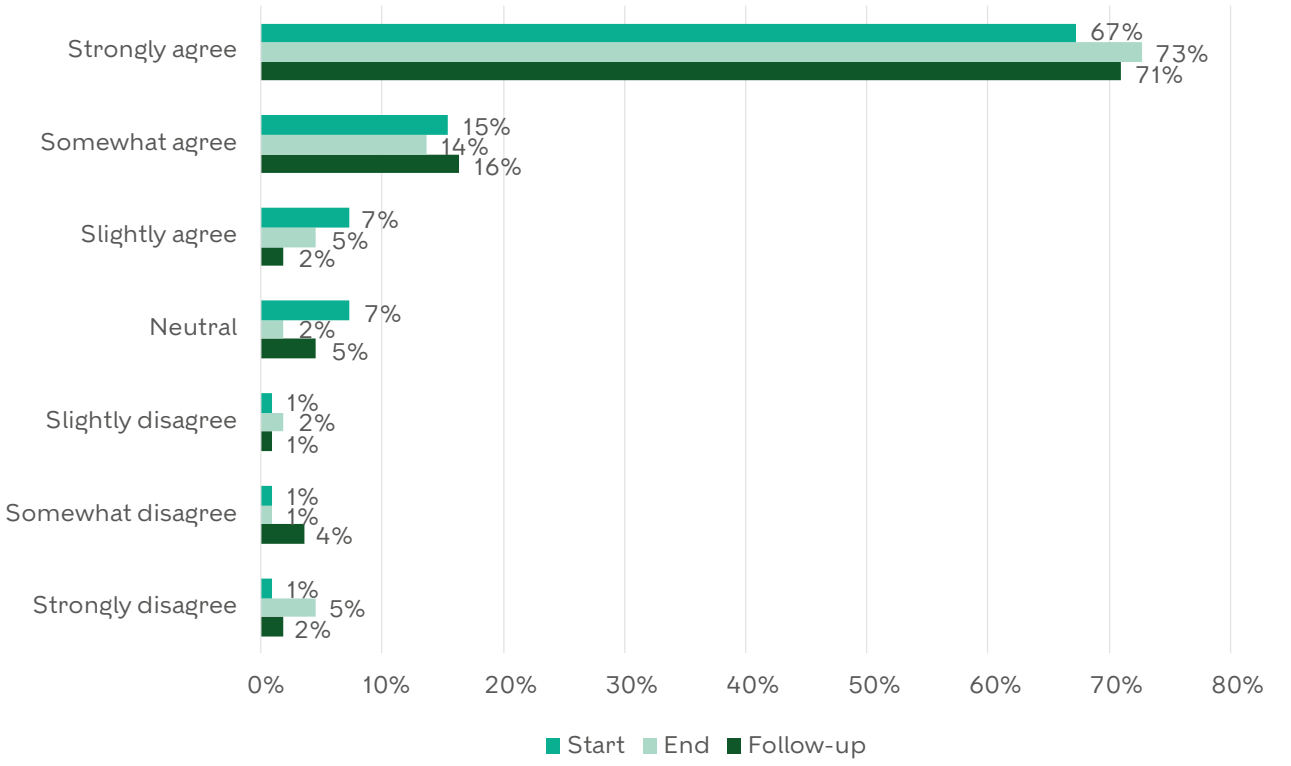
Figure 4.28 *Comfortableness discussing diabetes with a doctor/nurse (n=281)*



Development

Figure 4.29 shows the development among citizens who took part in all three evaluations in their comfortableness discussing diabetes with their doctor/nurse. By the end of the programme, there is an increase, with almost nine out of 10 feeling comfortable discussing diabetes with their doctor/nurse. This level is maintained six months later.

Figure 4.29 *Development in comfortableness discussing diabetes with a doctor/nurse (n=110)*



4.6 Social relationships

People who feel lonely are at increased risk of, among other things, high blood pressure, cardiovascular disease, and metabolic syndrome, while strong social relationships reduce the risk of developing mental health disorders and of premature death. At the same time, chronic disease increases the risk of loneliness, and prolonged loneliness and social isolation increase the risk of poor mental health and a range of chronic diseases[16].

People with type 2 diabetes can thus be vulnerable to loneliness. Social relationships and the perception of having a social network can have a positive impact on life with chronic disease.

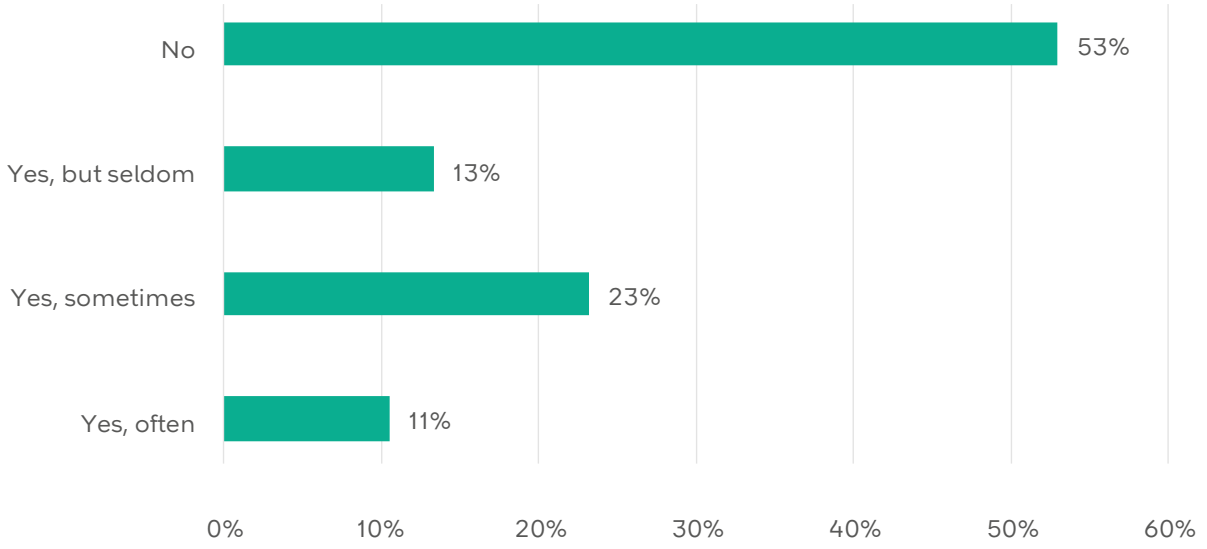
This section describes citizens' experience of social networks, support, and relationships. The same questionnaire items were used in the Health Profile 2017, however it is not possible to compare the two studies because the Health Profile 2017 calculates an overall score combining the following items and other items[1].

The following questionnaire items provide the basis for this section:

- Are you sometimes alone although you would prefer to be with others?
- Do you have someone to talk to if you have problems or need support?

Figure 4.30 shows that at the start of the rehabilitation programme more than half of the citizens answer 'no' to the question 'Are you sometimes alone although you would prefer to be with others?', while one in four answer 'yes, sometimes'. Slightly more than one in 10 citizens answer 'yes, but seldom'.

Figure 4.30 *Alone although would prefer to be with others (n=285)*



Development

Figure 4.31 shows the development among citizens who took part in all three evaluations in their experience of being alone although they would prefer to be with others. By the end of the programme, the percentage of those answering 'no' to the question is relatively unchanged. The percentage of citizens answering 'yes, but seldom' has increased by the end of the programme and further increased six months later, when it is one in four.

Figure 4.31 *Development – Alone although would prefer to be with others (n=110)*

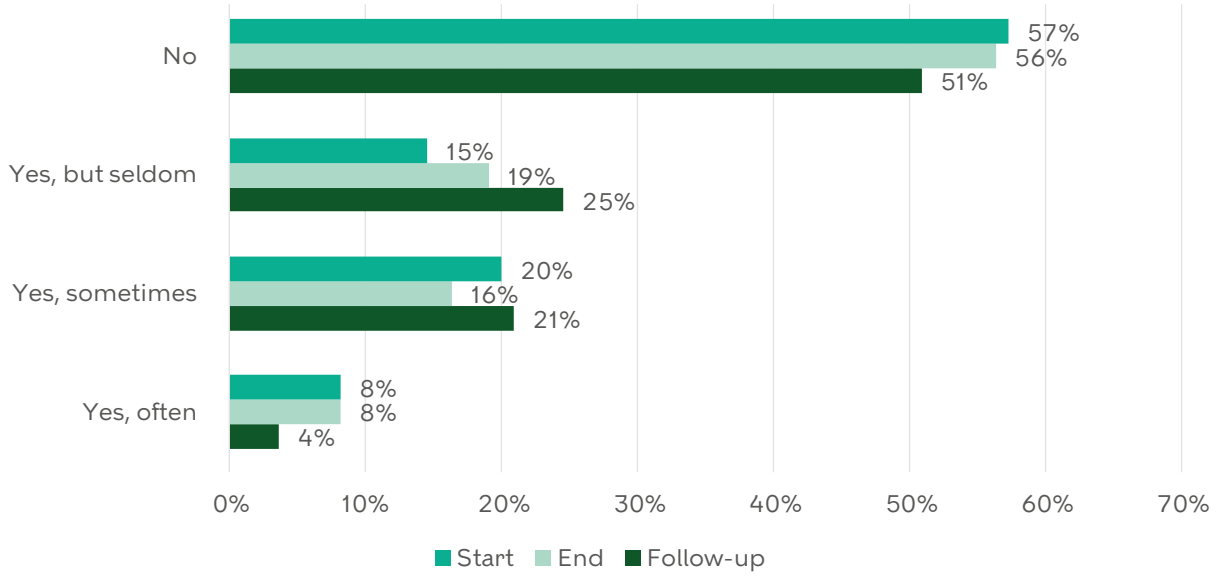
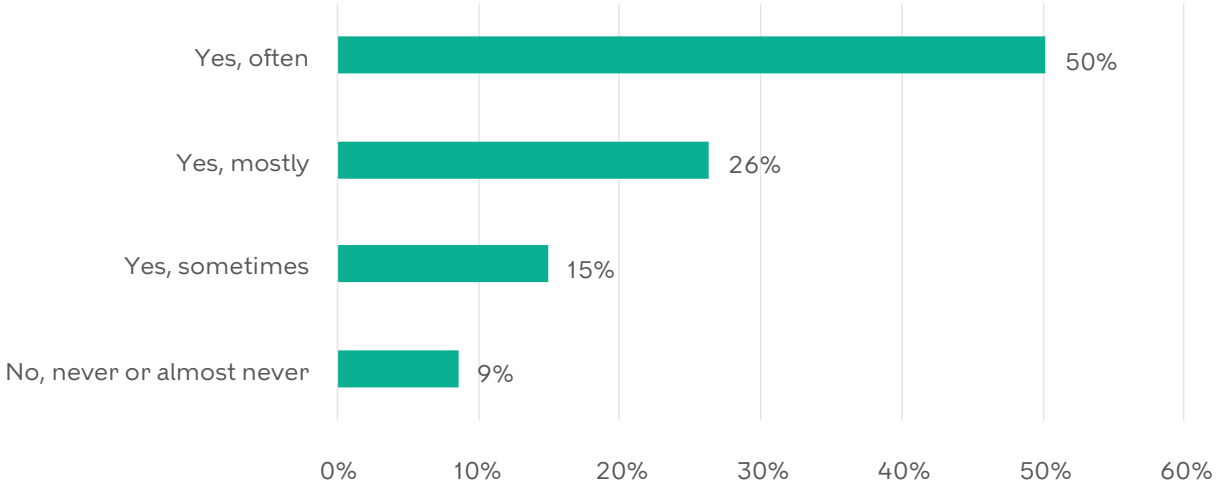


Figure 4.32 shows that at the start of the rehabilitation programme half of the citizens answer 'yes, often' to the question 'Do you have someone to talk to if you have problems or need support?'. One in four citizens answer 'yes, mostly', while slightly more than one in 10 answer 'yes, sometimes'. Slightly fewer than one in 10 answer 'no, never or almost never'.

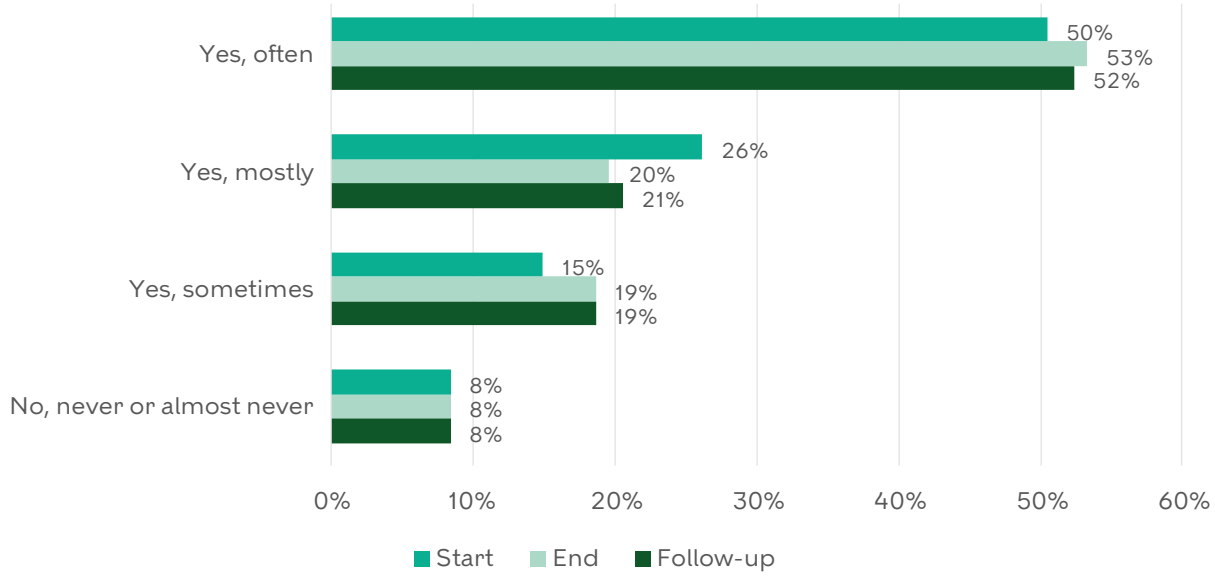
Table 4.32 *Do you have someone to talk to if you have problems or need support? (n=281)*



Development

Figure 4.33 shows the development among citizens who took part in all three evaluations in their experience of having someone to talk to if they have problems or need support. By the end of the programme and at the six-month follow-up, there is a small increase in the percentage of citizens answering the question 'yes, often' and 'yes, sometimes'. Almost one in 10 answer 'no, never or almost never'; the percentage remains unchanged from the start to the end of the programme and through to the six-month follow-up.

Figure 4.33 *Development – Do you have someone to talk to if you have problems or need support? (n=107)*



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5
SMOKING

5 Smoking

- At the start of the rehabilitation programme, around one in four citizens at the Centre for Diabetes are daily smokers.
- At the end of the rehabilitation programme, there are slightly fewer smokers, and this remains unchanged six months after the end of the programme.
- At the start of the rehabilitation programme, three out of four citizens are planning to stop smoking. At the end, this remains unchanged, while more are planning to stop smoking six months after the end of the programme.
- One in three citizens have quit smoking after a previous stop smoking intervention, while one in four have reduced their consumption.

Introduction

Smoking is generally unhealthy. People who smoke have worse health, more often rely on help in the final years of their life, more often must take early retirement and generally have worse self-reported quality of life compared to the rest of the population. Smoking is the main risk factor for death and loss of good years of life, and as such for maintaining good health[1].

Smoking increases the risk of developing type 2 diabetes and cardiovascular disease, and this risk increases with the amount of smoking[1]. People with type 2 diabetes are at increased risk of developing cardiovascular disease. Smoking is the main risk factor for cardiovascular disease in citizens with type 2 diabetes. For that reason, it is appropriate to focus on stopping smoking as part of the treatment and rehabilitation of people with type 2 diabetes[2].

Both group-based and individual stop smoking guidance increases the likelihood of people stopping smoking. Recommended stop smoking services are suitable for the vast majority of people who smoke. A few groups of people require special services[1].

This chapter describes the development in smoking status from the start of the rehabilitation programme through to six months after the end of the programme in order to see whether citizens change their smoking status and whether any changes are maintained. Smoking is also described in combination with other risk factors and motivation to change smoking habits.

In this chapter, the definitions of smoking status are those used in the Health Profile 2017[3].

Daily smokers	Citizens who smoke every day
Occasional smokers	Citizens who smoke at least once a week or less often than every week
Former smoker	Citizens who used to be smokers
Never-smokers	Citizens who have never smoked

5.1 Smoking habits

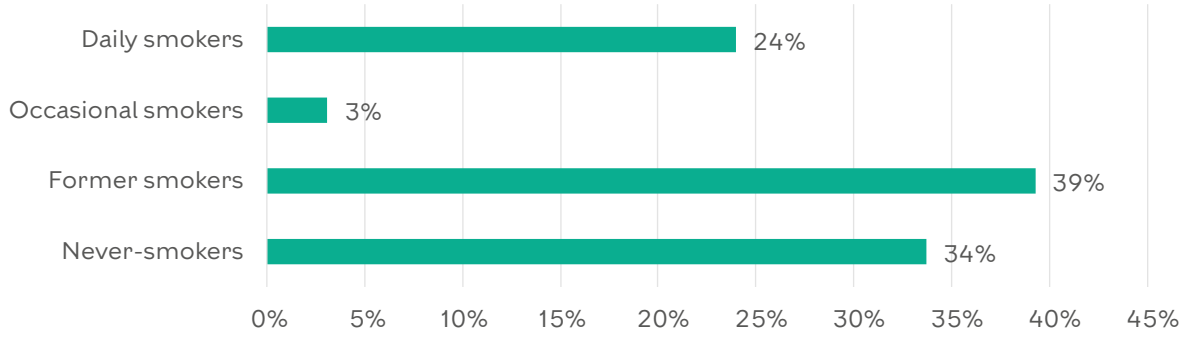
The following questionnaire item provides the basis for this section:

- Do you smoke?

The question is the same as that used in the Health Profile 2017[3].

Figure 5.1 shows that at the start of the rehabilitation programme 27% of citizens smoke daily or occasionally. By comparison, in the Capital Region of Denmark and the City of Copenhagen 20% of citizens with diabetes smoke[4,5]. At the start of the rehabilitation programme, 39% of citizens are former smokers and 34% have never smoked.

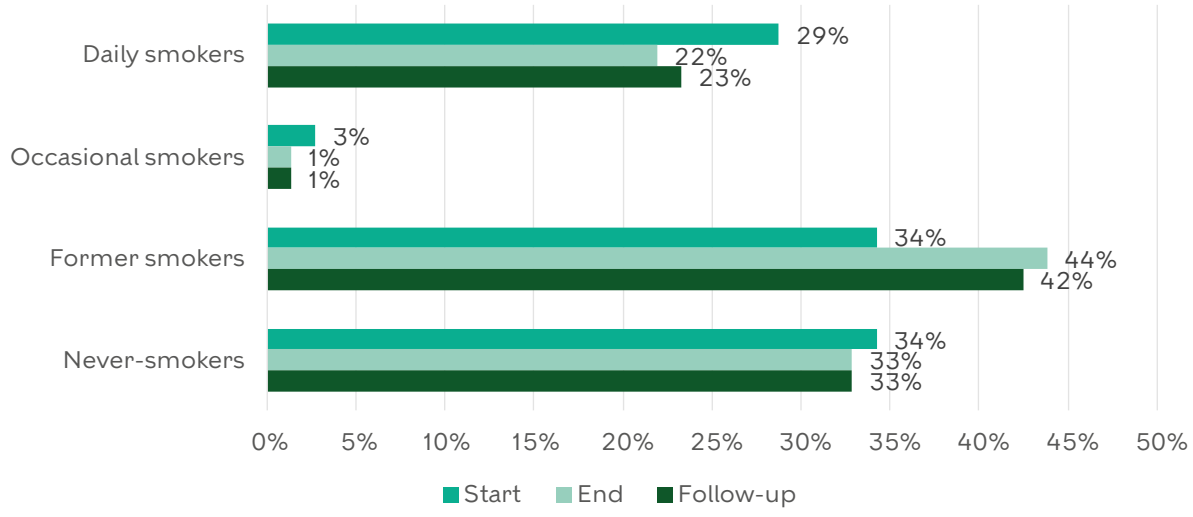
Figure 5.1 *Smoking habits at the start of the programme (n=288)*



Development

Figure 5.2 shows the development in smoking habits among citizens who took part in all three evaluations. It can be seen that the percentage of daily smokers falls. At the start of the rehabilitation programme, 29% of citizens are daily smokers. By the end of the programme, many citizens have stopped smoking. This trend is still present six months after the end of the programme.

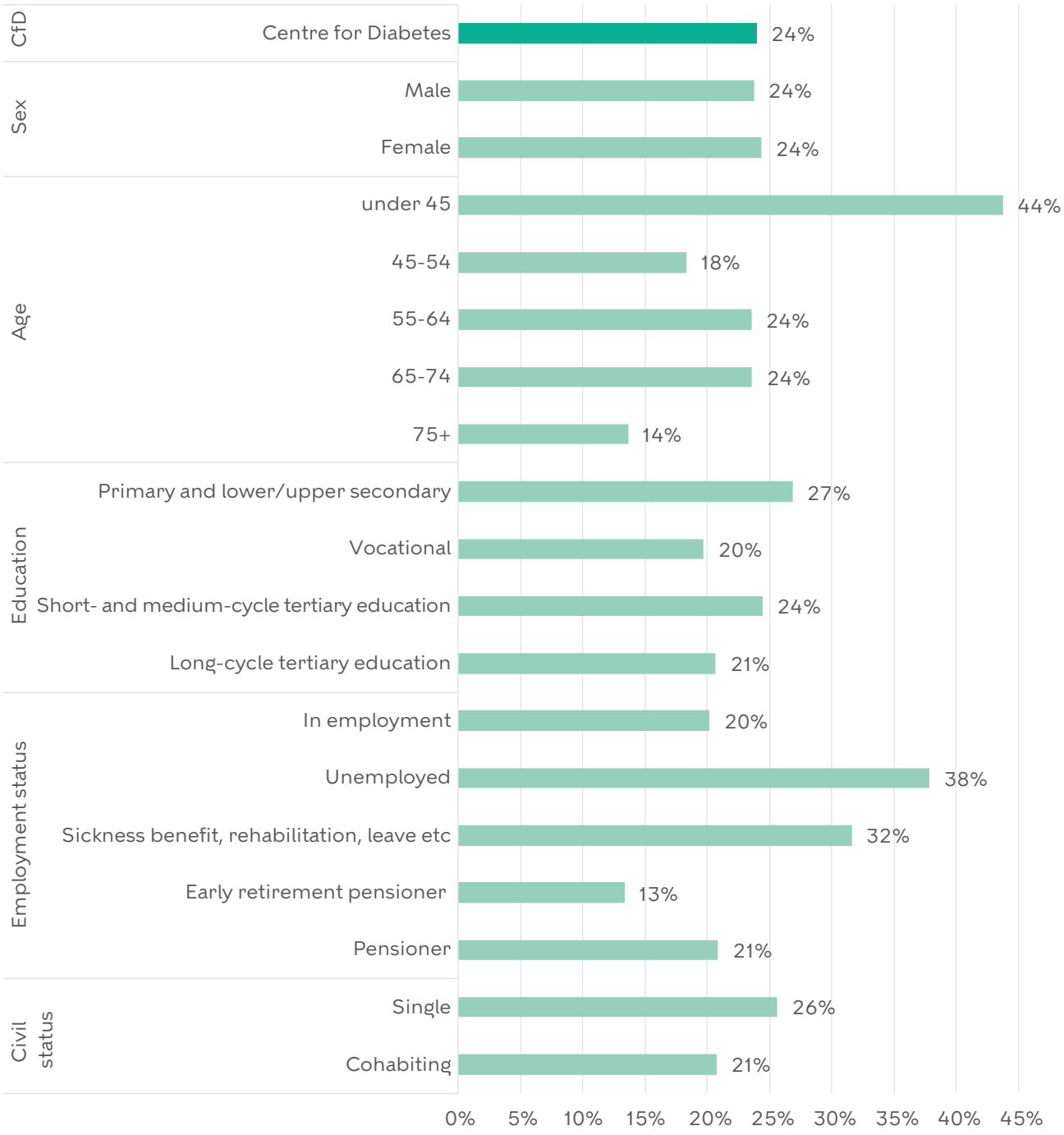
Figure 5.2 *Development in smoking habits (n=73)*



5.2 Daily smoking

Figure 5.3 describes the sociodemographic distribution of citizens who are daily smokers at the start of the rehabilitation programme.

Figure 5.3 *Daily smoking*



Centre for Diabetes: At the start of the programme, just under one in four citizens are daily smokers.

Sex: The distribution of daily smokers between men and women is equal. In the general population of the Capital Region of Denmark, there is a slightly higher percentage of men who smoke than women [6].

Age: The percentage of daily smokers is highest in the under-45 age group, possibly due to the small number of citizens in this group. In the other age groups, the percentage of daily smokers increases with age up to the 75+ group, where the percentage falls.

Education: There is no clear social gradient in relation to education and smoking. One in four citizens with a primary and lower secondary/upper secondary education or a short- and medium-cycle tertiary education are daily smokers. One in five with a vocational education or a long-cycle tertiary education are daily smokers.

Employment status: One in five citizens in employment are daily smokers. The percentage of daily smokers is higher among citizens outside the labour market. In particular among those who are unemployed and in receipt of sickness benefits.

Civil status: The percentage of daily smokers among single citizens is higher than for cohabiting citizens.

5.3 Daily smoking combined with other risk factors

The table below shows the distribution of selected risk factors among daily smokers compared with citizens who do not smoke or do not smoke daily at the start of the rehabilitation programme.

Table 5.4 shows that among daily smokers the percentage with 'fair' or 'poor' self-rated health is higher compared with never-smokers or occasional smokers. Two out of three daily smokers have 'fair' or 'poor' self-rated health, compared with just over half among citizens who are never-smokers or occasional smokers.

Among daily smokers, the percentage with short or long sleep length is higher than among never-smokers or occasional smokers. One in three daily smokers have short or long sleep length, compared with one in five never-smokers or occasional smokers.

Among daily smokers, the percentage showing signs of high alcohol consumption is higher than among never-smokers or occasional smokers. 50% of the daily smokers show signs of high alcohol consumption, 15% higher than for never-smokers or occasional smokers.

When comparing between daily smokers and never-smokers or occasional smokers, there are no statistically significant differences in the percentages of citizens who have obesity, are not meeting the Danish Veterinary and Food Administration's dietary recommendations or not meeting WHO's recommendations for physical activity.

Table 5.4 *Incidence of selected risk factors among citizens who smoke daily and among citizens who do not smoke or do not smoke daily*

	Daily smokers, %	Never-smokers or occasional smokers, %
'Fair' or 'poor' self-rated health	69.6*	51.6
Obesity (BMI ≥ 30)	65.7	66.0
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	28.4	17.9
Not meeting WHO's recommendations for physical activity	71.0	71.0
Short/long sleep length	31.3*	18.2
Signs of high alcohol consumption	50.0*	35.0

** Statistically significant difference.*

5.4 Motivation to change smoking habits

The following questionnaire items provide the basis for this section:
If the citizen answers yes to the question 'Do you smoke?':

- Would you like to stop?
- Have you ever been offered a stop smoking course?

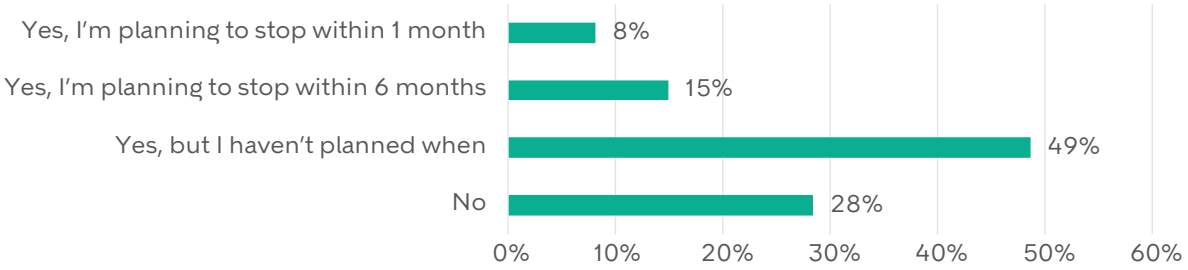
The questions are the same as those used in the Health Profile 2017 [3].

Stop smoking interventions can take place in all areas of the health service, for example with a GP, though contact with a hospital or in local-authority services.

Want to stop smoking

Figure 5.5 shows that just under three out of four daily smokers at the start of the programme are planning to stop. 8% are planning to stop smoking within one month and 15% within six months. Half have planned to stop smoking but not when, and one in four are not planning to stop smoking.

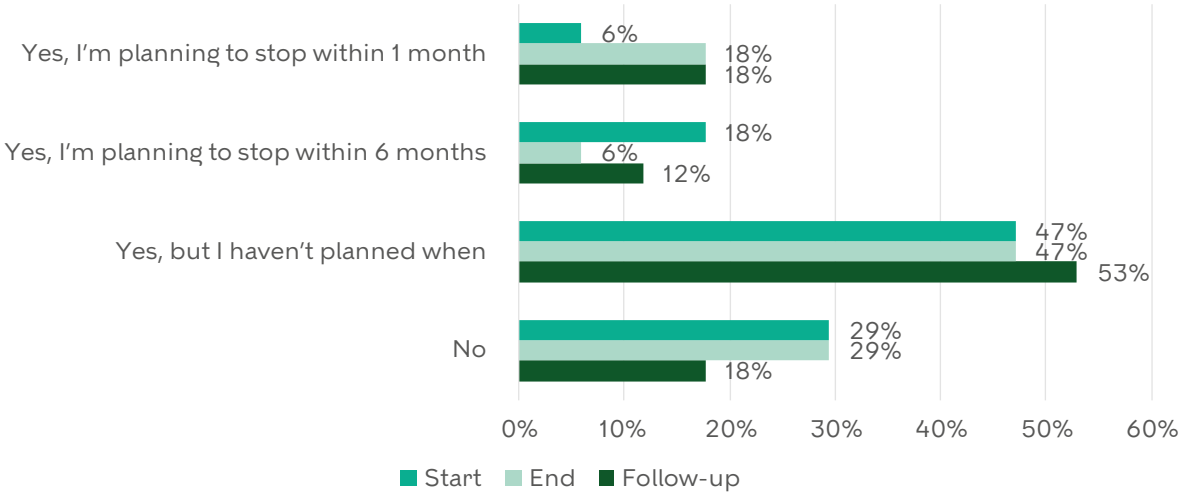
Figure 5.5 *Smokers planning to stop smoking at the start of the programme (n=74)*



Development

Figure 5.6 shows the development among citizens who are smokers at the start of the programme and planning to stop smoking. By the end of the programme, three times as many citizens are motivated to stop smoking within one month. This trend is still present six months later. From the end of the programme to the six-month follow-up evaluation, there is a decrease of one-third in smokers who are not planning to stop.

Figure 5.6 *Development among smokers planning to stop smoking (n=23)*



Offered a stop smoking course

Figure 5.7 shows that one in three citizens who are smokers or former smokers have been offered help to stop smoking. Just under half have not been offered help to stop smoking and approximately one in four do not consider the question relevant.

Figure 5.7 *Smokers or former smokers who have been offered a stop smoking course (n=151)*

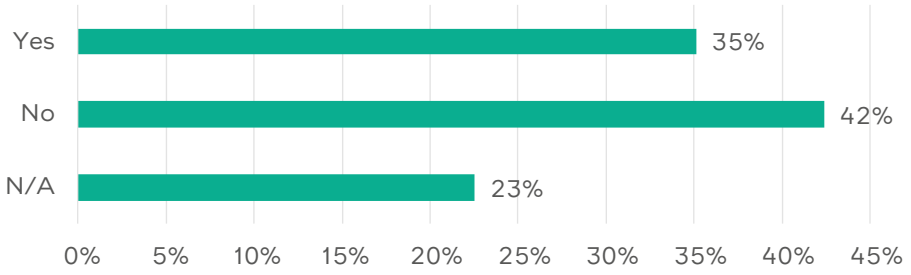
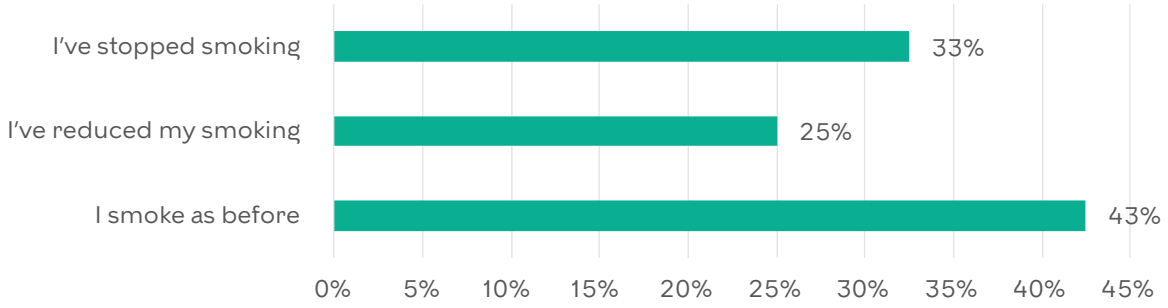


Figure 5.8 shows that one in three citizens have stopped smoking after a previous stop smoking intervention. One in four have reduced their smoking, and just under half are smoking as before.

Figure 5.8 *Results of previous stop smoking interventions (n=40)*



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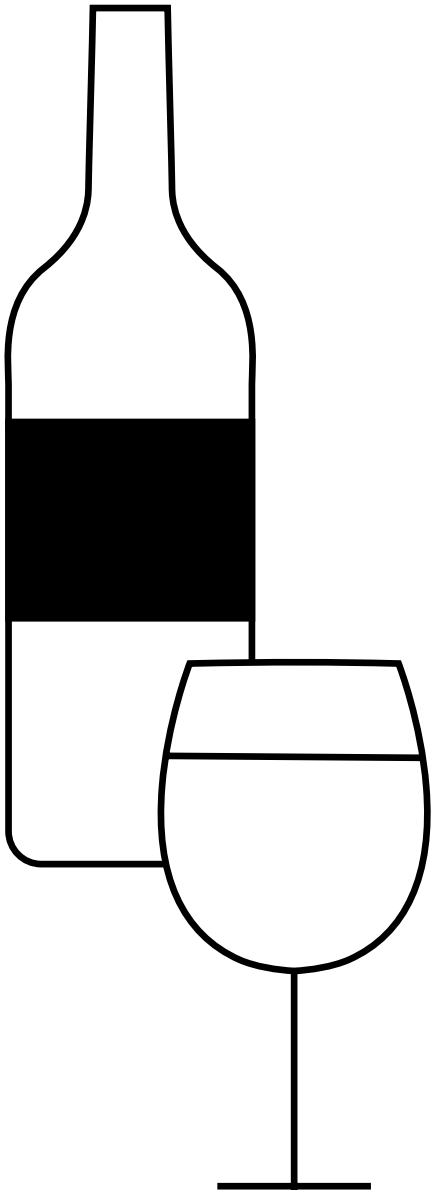


6
ALCOHOL

6 Alcohol

- There are no evident changes in citizens' alcohol consumption from the start of the rehabilitation programme to six months after the end.
- At the start of the rehabilitation programme, around 40% of citizens show signs of high alcohol consumption.
- At the start of the programme, one in 10 citizens drink alcohol at least four times a week. By the end of the programme, this has fallen to one in 20 citizens.
- The majority of citizens rarely or never drink five or more units of alcohol on one occasion.
- One in five citizens have felt within the last 12 months that they should reduce their alcohol consumption.

The Impact evaluation was started by the end of 2018 and hence the study is based on the recommendations applicable at the time from the Danish Health Authority. These recommendations consist of seven announcements to the population regarding the use of alcohol:

Danish Health Authority's seven statements on alcohol[1]

- No alcohol consumption is risk-free for your health.
- For the sake of your health, do not drink alcohol.
- Women who drink seven units of alcohol per week and men who drink 14 units per week are at low risk of alcohol-related disease.
- Women who drink more than 14 units of alcohol per week and men who drink more than 21 units per week are at high risk of alcohol-related disease.
- Do not drink more than five units on one occasion.
- If you are pregnant, avoid alcohol. If you are trying to fall pregnant, avoid alcohol to be on the safe side.
- If you are elderly, be particularly careful with alcohol.

Introduction

In Denmark, around 10% of the adult population consume alcohol in excess of the low-risk thresholds of 7 units per week for women and 14 units per week for men. Furthermore, the Health Profile 2017 shows that 6.7% of the adult population consume alcohol in excess of the Danish Health Authority's recommendations of maximum 14 units per week for women and 21 units per week for men[2].

High alcohol consumption is one of the factors with the biggest impact on public health in Denmark. It is associated with increased risk of disease and higher mortality as well as poor well-being and reduced quality of life. At the same time, a large number of chronic diseases can be wholly or partly attributed to high alcohol consumption[2].

Alcohol can cause disruptions in blood sugar levels in people with diabetes, with low blood sugar a particular risk. People with well-regulated type 2 diabetes are advised to follow the Danish Health Authority's recommendations, while people affected by comorbidities in the form of pancreatitis, peripheral neuropathy or high cholesterol should be careful about their alcohol consumption. People on insulin should also be aware of low blood sugar when consuming alcohol.

The Danish Health Authority has issued seven statements advising the public on alcohol consumption based on the available research in this field[3].

This chapter describes the group of citizens with high alcohol consumption, how often alcohol is consumed, number of units consumed, how often alcohol is consumed in excess of five units and motivation to reduce alcohol consumption.

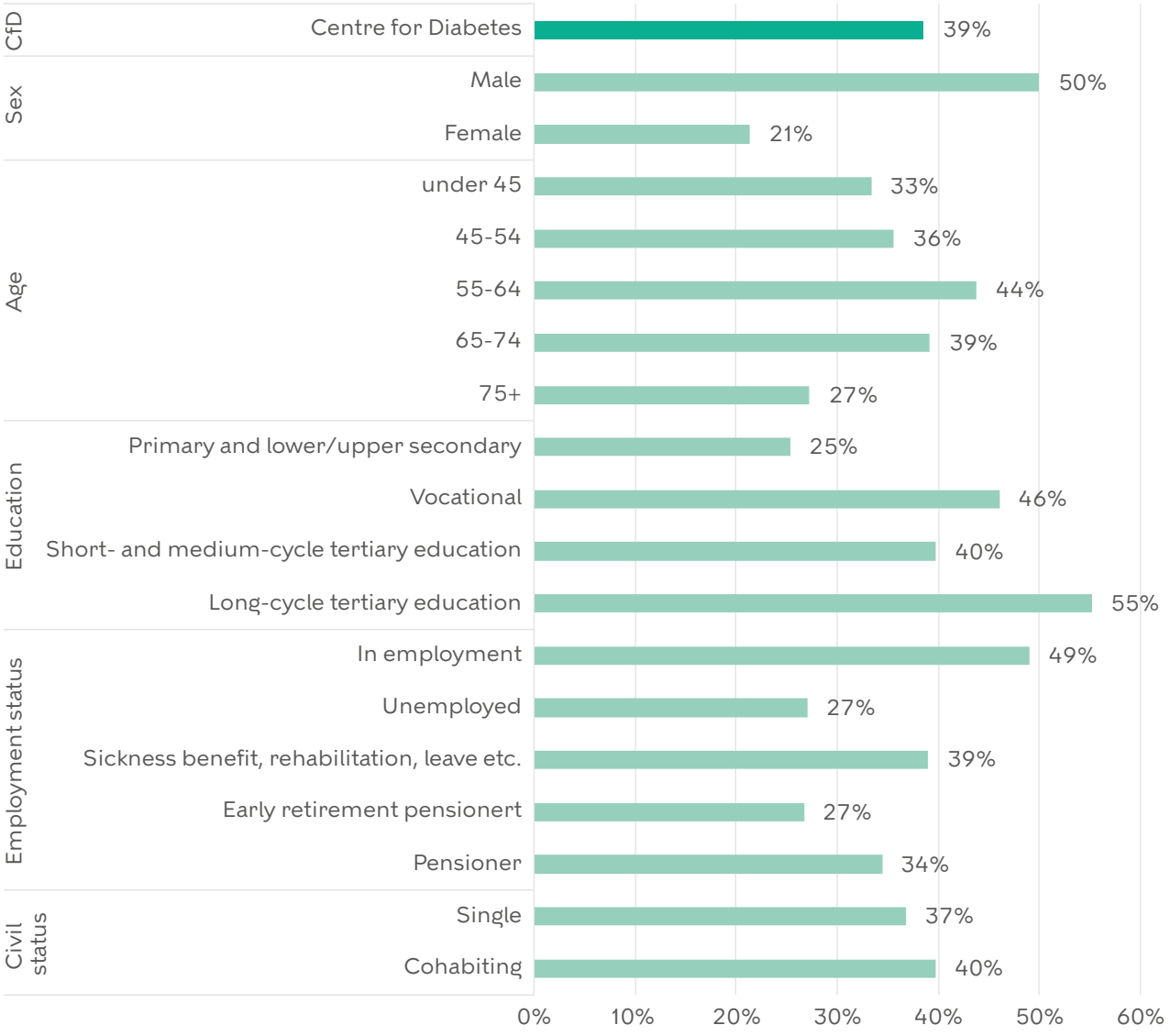
6.1 Citizens with signs of high alcohol consumption

This section describes possible high alcohol consumption in citizens. The evaluation takes its starting point from a short version of the Alcohol Use Disorder Test (AUDIT) screening tool known as AUDIT-C *(see Appendix 6)*.

AUDIT comprises 10 questions and was developed by the World Health Organization (WHO) to identify people with harmful alcohol consumption; the total score on all 10 questions can indicate whether a citizen's alcohol consumption is excessive[4]. If a citizen scores four points or more in AUDIT-C, there may be a suspicion of excessive alcohol consumption. Alcohol dependency can be identified through the full AUDIT questionnaire, which incorporates an additional seven questions; this does not fall within the scope of the impact evaluation[5].

In the following, a score of four points or more is treated as a sign of high alcohol consumption. Figure 6.1 describes the sociodemographic distribution of citizens scoring four points or more in AUDIT-C at the start of the rehabilitation programme. The Health Profile 2017 uses other measuring tools and comparisons are not therefore possible.

Figure 6.1 *Distribution of citizens with signs of high alcohol consumption (AUDIT-C ≥ 4)*



Centre for Diabetes: Almost four out of 10 citizens starting a programme at the Centre for Diabetes show signs of high alcohol consumption.

Sex: The percentage of men showing signs of high alcohol consumption is more than twice as high as that for women.

Age: The percentage of citizens showing signs of high alcohol consumption is highest in the 55-64 age group.

Education: There is no clear social gradient in the incidence of signs of high alcohol consumption. However, there is a significantly higher percentage of citizens showing signs of high alcohol consumption in the long-cycle tertiary education group than in the other groups. More than half of the citizens with a long-cycle tertiary education show signs of high alcohol consumption, compared with just 40% for citizens with a short-/medium-cycle education and 46% for citizens with a vocational education.

Employment status: The percentage of citizens showing signs of high alcohol consumption is twice as high for citizens in employment as for unemployed citizens and early retirement pensioners.

Civil status: The percentage of citizens showing signs of high alcohol consumption is roughly the same in the cohabiting group and the single group.

6.2 High alcohol consumption combined with other risk factors

This section shows the distribution of selected risk factors among citizens with signs of high and low alcohol consumption (corresponding to AUDIT-C scores of ≥ 4 and < 4) at the start of the rehabilitation programme.

Table 6.2 shows that among citizens scoring ≥ 4 in AUDIT-C there are statistically significant higher percentages of those who are not meeting the Danish Veterinary and Food Administration's dietary recommendations and those who are daily smokers. For the other risk factors, there are no statistically significant differences.

Table 6.2 *Incidence of selected risk factors among citizens scoring ≥ 4 in AUDIT-C and among citizens scoring < 4 in AUDIT-C*

	Signs of **high** alcohol consumption, %	Signs of **low** alcohol consumption, %
'Fair' or 'poor' self-rated health	54.5	56.5
Obesity (BMI ≥ 30)	66.4	66.3
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	28.6*	15.7
Daily smoking	30.6*	19.2
Not meeting WHO's recommendations for physical activity	69.6	71.9
Short/long sleep length	18.5	23.1

**Statistically significant between-groups difference.*

6.3 Alcohol consumption

The following sections describe the distribution of citizens for the three questions comprising AUDIT-C.

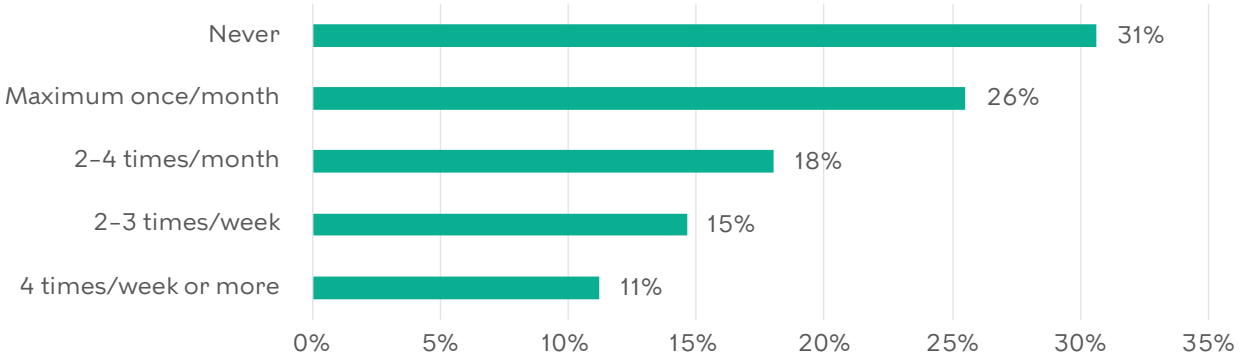
The following questionnaire items provide the basis for this section:

- How often do you drink alcohol?
- How many units of alcohol do you generally have when you are drinking? (men and women)
- How often do you drink 5 or more units on one occasion?

Frequency of alcohol consumption

Figure 6.3 shows how often citizens referred to the Centre for Diabetes consume alcohol. One in three citizens never consume alcohol and one in four consume alcohol no more than once per month. One in five consume alcohol two to four times per month. Of all the citizens, one in four consume alcohol two or more times per week.

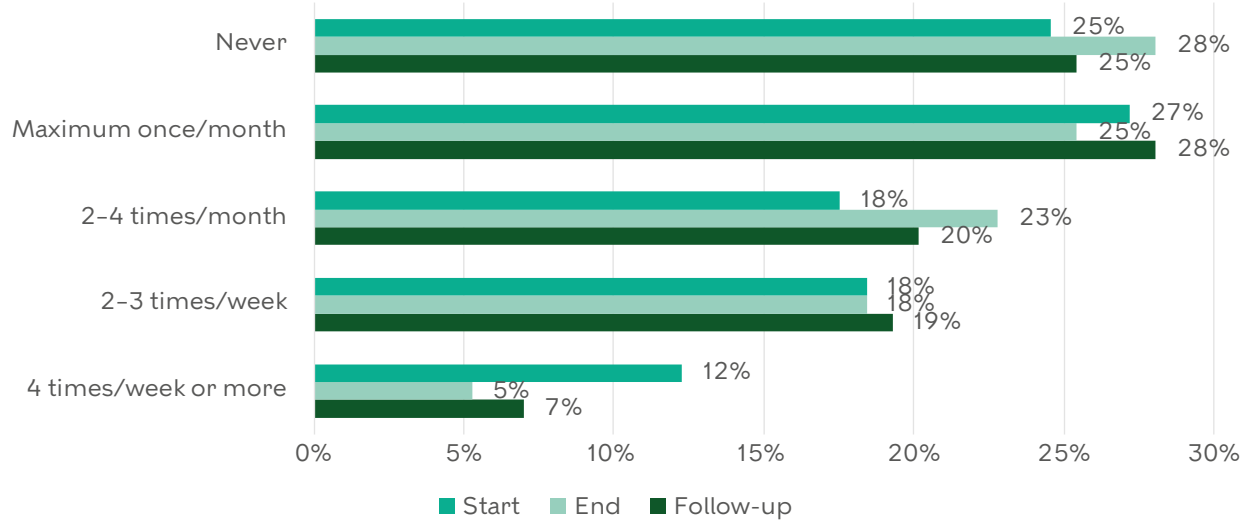
Figure 6.3 *Frequency of alcohol consumption (n=294)*



Development

Figure 6.4 shows the development in alcohol consumption among citizens who took part in all three evaluations. By the end of the rehabilitation programme, there has been a shift towards lower alcohol consumption. Specifically, the percentage of citizens who never consume alcohol has increased by 3 percentage points, though by the six-month follow-up evaluation it has returned to the baseline figure. Furthermore, the percentage of citizens who consume alcohol at least four times per week decreases by 7 percentage points (from 12% to 5%). This decrease holds up well through to the six-month follow-up evaluation.

Figure 6.4 *Development in alcohol consumption (n=114)*

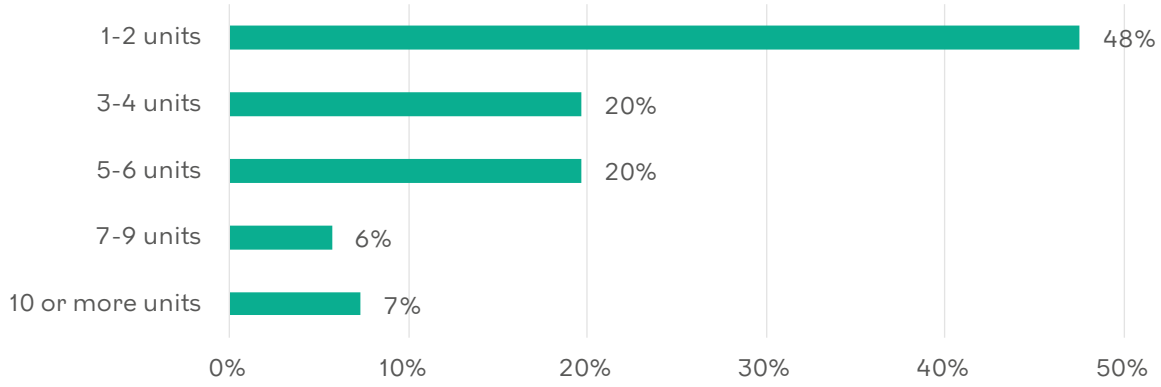


Number of units

The Danish Health Authority's recommendations differ in the alcohol limits that men and women should not exceed. The following describes *how much* men and women consume when they drink alcohol, but not *how often* they drink alcohol *(see figure 6.5, 6.6, 6.7 and 6.8)*.

Figure 6.5 shows the distribution of units generally consumed by men when drinking alcohol at the start of the rehabilitation programme. Just under half of all the men consume one to two units when drinking alcohol, while one in five consume three to four units and the same proportion consume five to six units. A small percentage consume seven or more units.

Figure 6.5 *Number of units - men (n=121)*



Development

Figure 6.6 shows the development in how many units men consume. There is no clear pattern. It can be seen that almost 75% of the men generally consume one to four units when drinking alcohol. This figure is unchanged both at the end of the programme and at the six-month follow-up evaluation. At the same time, it can be seen that 10% of the men consume seven or more units when drinking alcohol. This figure has increased both at the end of the programme and at the six-month follow-up evaluation.

Figure 6.6 *Development in number of units - men (n=49)*

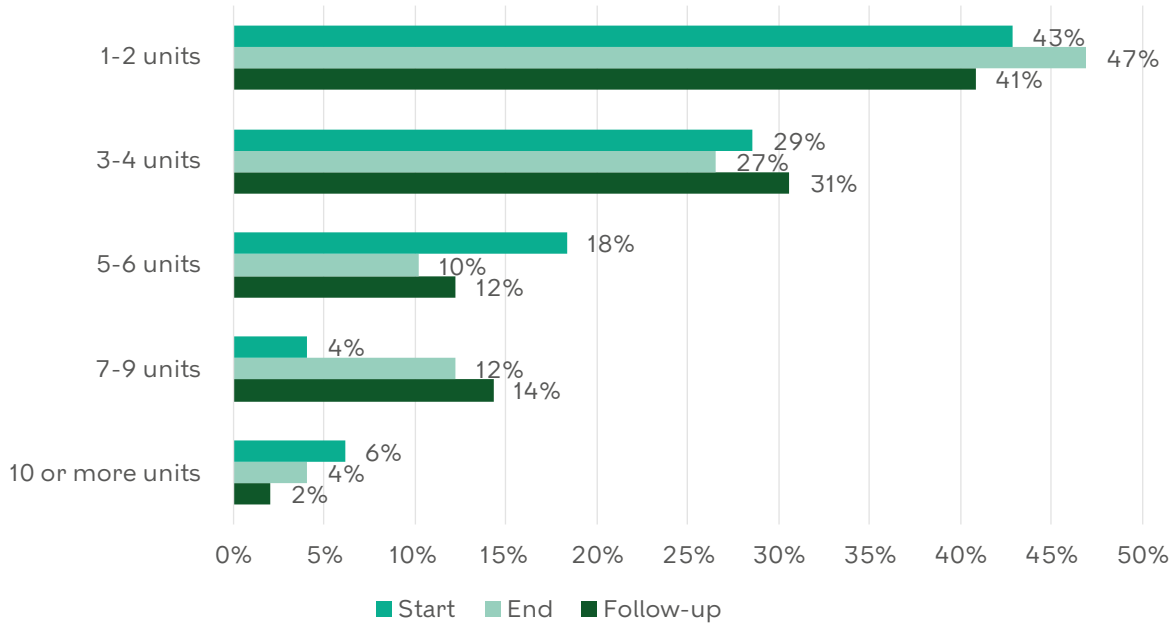
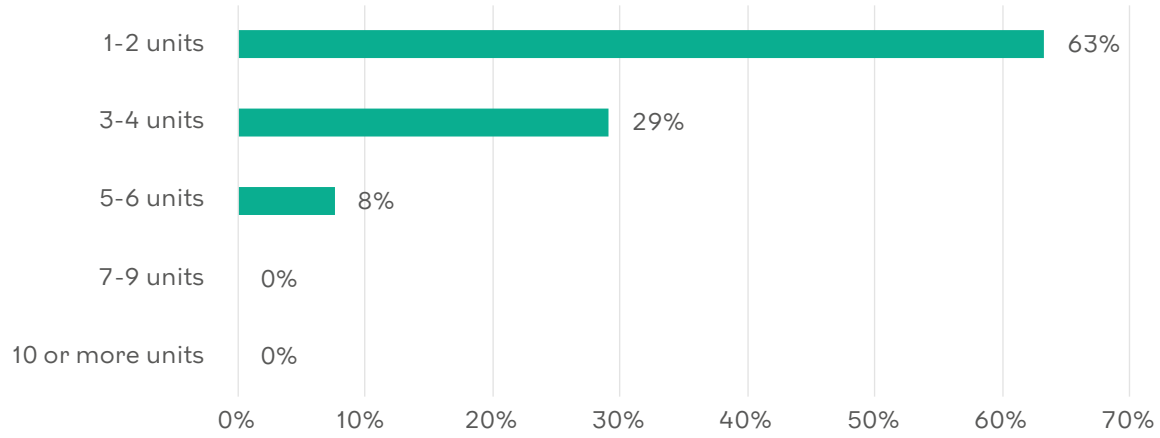


Figure 6.7 shows that two out of three women consume one to two units when drinking alcohol, while one in three consume three to four units. A small percentage consume five or more units when drinking alcohol.

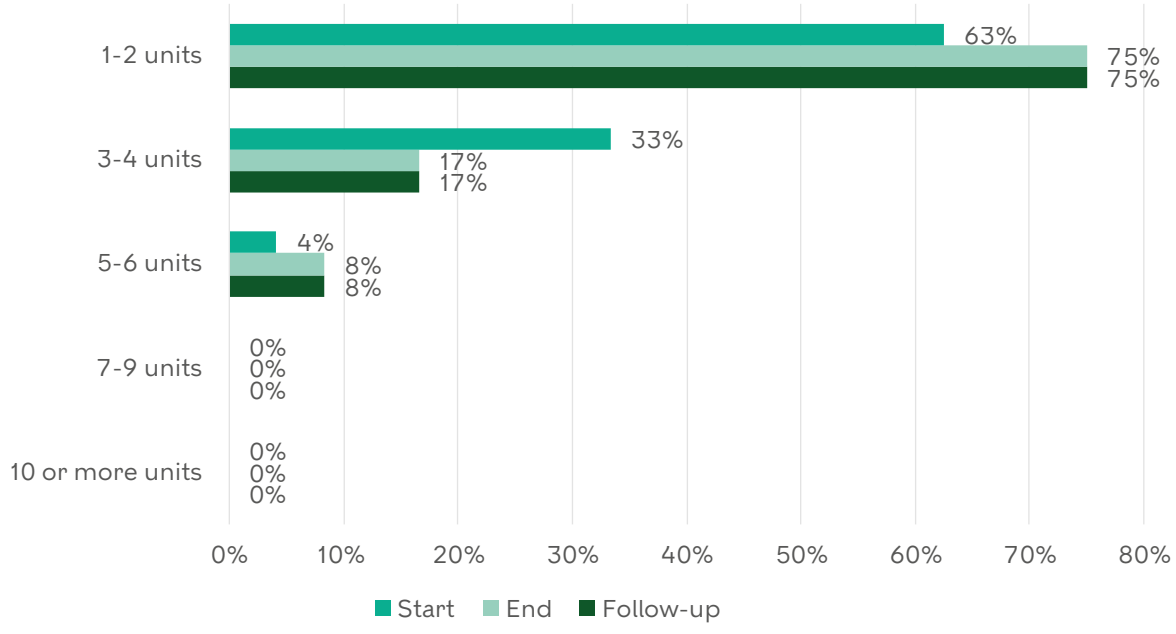
Figure 6.7 *Number of units - women (n=79)*



Development

Figure 6.8 shows the development in number of units consumed among those women who took part in all three evaluations. By the end of the rehabilitation programme, fewer women consume three to four units and there is a corresponding increase in women consuming one to two units when drinking alcohol. The percentage is unchanged six months after the end of the programme.

Figure 6.8 *Development in number of units - women (n=24)*

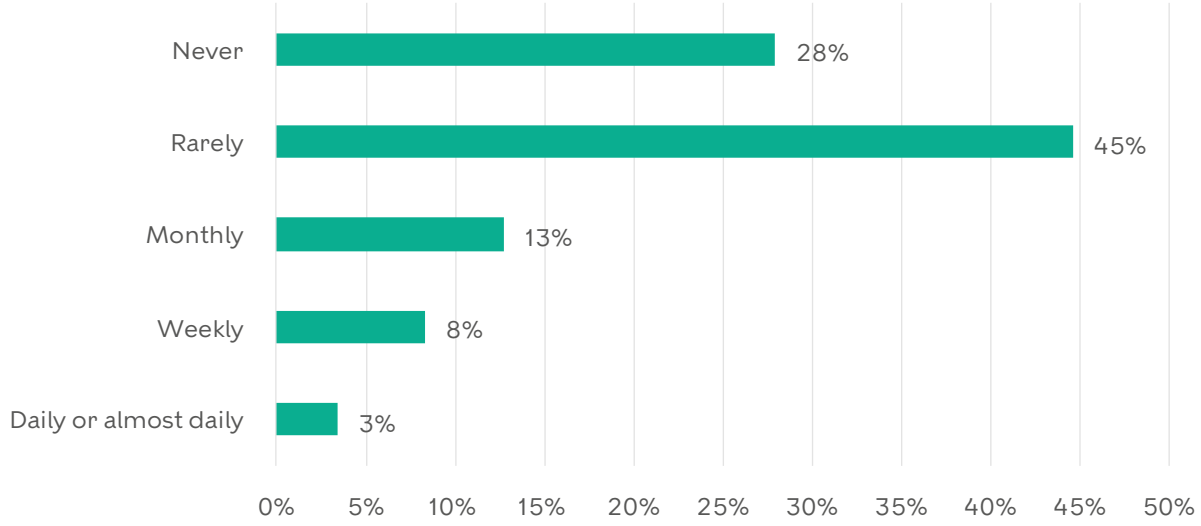


Binge drinking

The Danish Health Authority recommends avoiding consuming more than five units on one occasion. This question is also part of AUDIT-C.

Figure 6.9 shows that three out of four citizens rarely or never consume five units or more on one occasion. A small percentage of citizens consume five units or more daily or almost daily. Just under one in 10 consume five units or more on one occasion on a weekly basis.

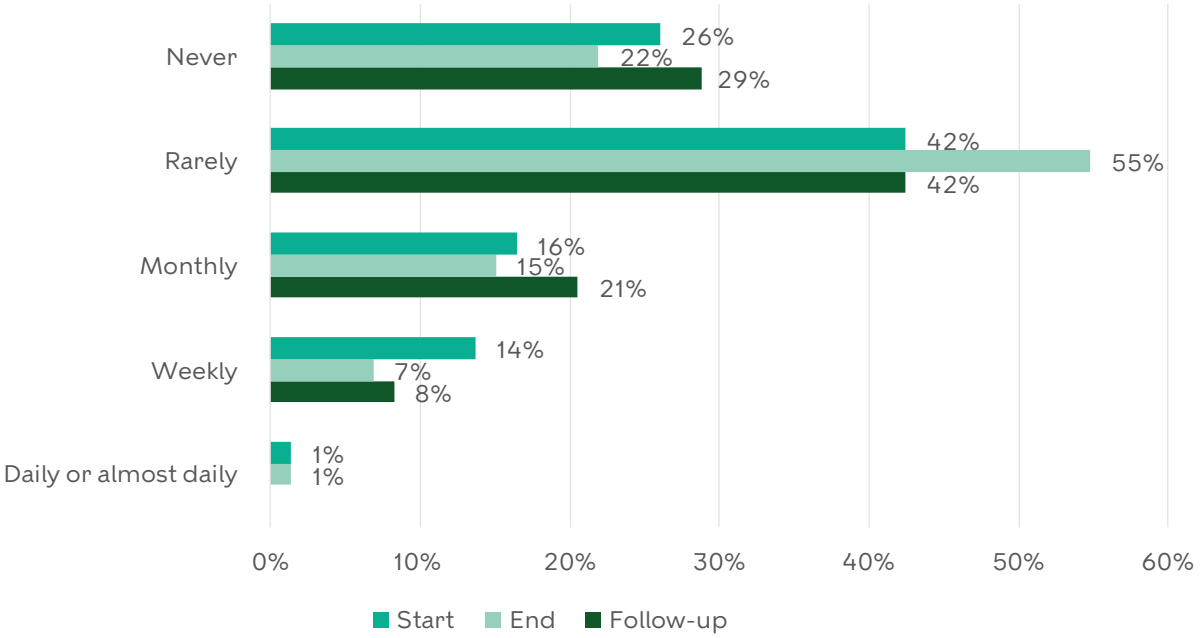
Figure 6.9 *Consumption of five units or more on one occasion (n=204)*



Development

Figure 6.10 shows the development in consumption of five units or more on one occasion among those citizens who took part in all three evaluations. Both at the end of the rehabilitation programme and six months later, there has been a 50% decrease in citizens consuming five units or more on one occasion on a weekly basis. Similarly, there is an increase at the six-month follow-up evaluation among citizens consuming five units or more on one occasion on a monthly basis.

Figure 6.10 *Development in consumption of five units or more on one occasion (n=73)*



6.5 Motivation to reduce alcohol consumption

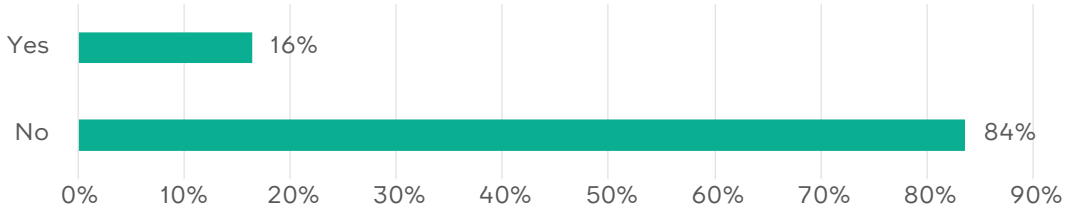
This section concerns citizens' motivation to reduce their alcohol consumption.

The following questionnaire item provides the basis for this section:

- Within the last 12 months, have you felt you should reduce your alcohol consumption?

Figure 6.11 shows that within the last year 16% of citizens have considered reducing their alcohol consumption, compared with 36% for citizens generally in the Capital Region of Denmark.

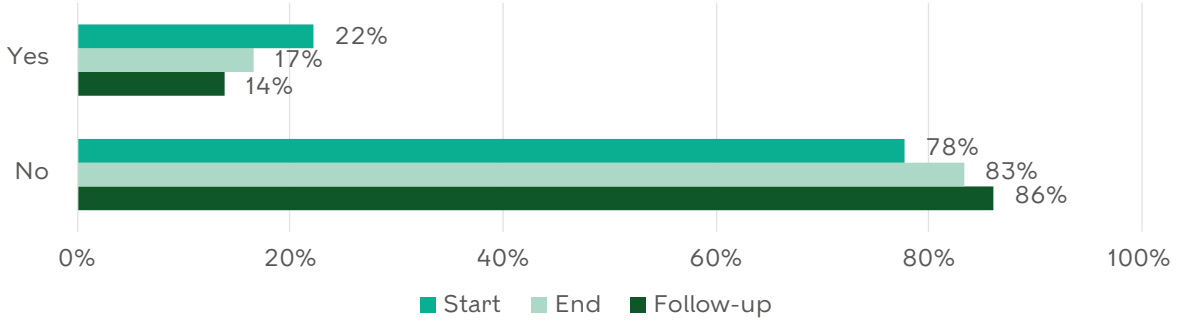
Figure 6.11 *Motivation to reduce alcohol consumption (n=201)*



Development

Figure 6.12 shows the development among those citizens who took part in all three evaluations in their motivation to reduce their alcohol consumption. There is a trend towards fewer citizens feeling that they should reduce their alcohol consumption, both from the start to the end of the programme and from the end of the programme to the six-month follow-up evaluation.

Figure 6.12 *Motivation to reduce alcohol consumption (n=72)*



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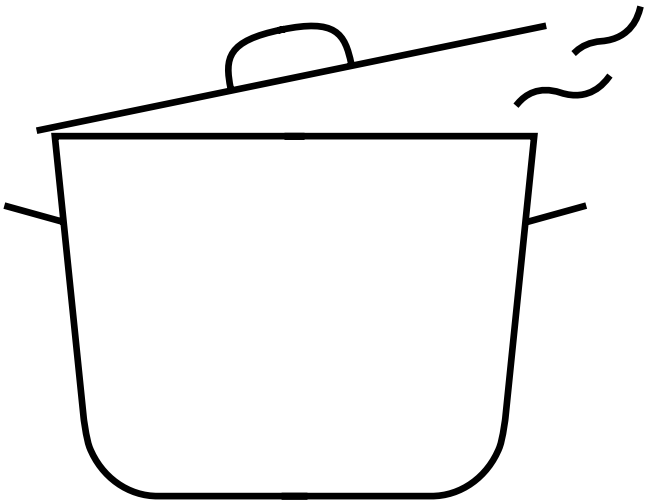


7
DIET

7 Diet

- The percentage of citizens who feel that they have healthy eating habits is twice as high at the end of the programme as at the start. Six months after the end of the programme, the level is still higher compared with the start, but lower compared with the end.
- From the start to the end of the programme, there is a general trend for citizens to eat more vegetables and a more appropriate quantity of fruit, in other words neither too much nor too little.
- At the start of the programme, a minority of citizens are eating the recommended quantities of fish and almonds/nuts. At the end of the programme and six months later, more are eating the recommended quantities.
- There is an evident trend for citizens to generally eat less cake, chocolate, sweets and ice cream at the end of the programme compared with the start.
- Generally, there is an evident trend for citizens to drink fewer sugary drinks at the end of the programme and six months later. Among those citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations, there are significantly more who are daily smokers and have a short or long sleep length compared with the group meeting the recommendations.

Introduction

Healthy eating habits are important for preventing a range of behaviour-related diseases, including cardiovascular disease, type 2 diabetes and cancer[1].

The Danish Veterinary and Food Administration's Official Dietary Guidelines comprise seven rules for adopting a healthy eating pattern. Citizens who follow the rules have an appropriate intake of fruit and vegetables, dietary fibre and healthy fats, and consume less salt and sugar. Their daily needs for vitamins and minerals are also met[2]. These dietary rules also apply for people with diabetes.

This chapter describes various aspects of citizens' eating patterns, including whether they are following the official dietary guidelines, with a focus on consumption of fruit, vegetables, fish and almonds/nuts. It then describes citizens' consumption of inappropriate foods with high calorie and sugar content, such as fast food, sweets or cakes, and sweet drinks with or without added sugar.

The questionnaire that was used took its starting point from the cardiac diet plan and the Capital Region of Denmark's Health Profile 2017. The foods covered by the questionnaire are regarded as suitable for inclusion in a healthy eating pattern[3].

The Danish Veterinary and Food Administration's Official Dietary Guidelines (2021)

- Eat plant-rich, varied and not too much.
- Eat more vegetables and fruit.
- Eat less meat – choose legumes and fish.
- Eat wholegrain foods.
- Choose vegetable oils and low-fat dairy products.
- Eat less sweet, salty and fatty food.
- Thirsty? Drink water.

7.1 Eating pattern

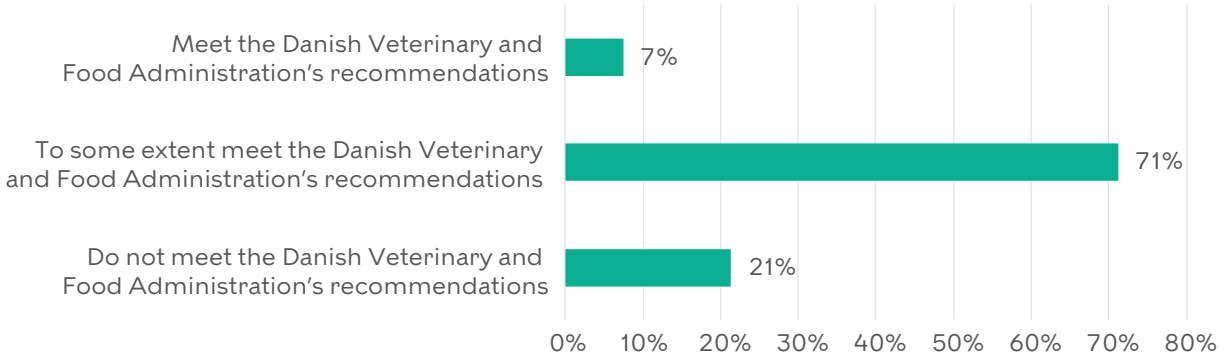
This section describes the extent to which citizens are meeting the Danish Veterinary and Food Administration's dietary recommendations.

An assessment was carried out based on the Danish Veterinary and Food Administration's recommendations relating to fruit, vegetables, fish and almonds/nuts. Points were awarded according to whether the citizen consumes the recommended quantities of the particular food group *(see Appendix 7 for an overview of the assessment and awarding of points)*.

The assessment has not been validated and cannot therefore be compared with other assessments.

Figure 7.1 shows that at the start of the rehabilitation programme fewer than one in 10 citizens meet the Danish Veterinary and Food Administration's dietary recommendations relating to fruit, vegetables, fish, and almonds/nuts. Just under three out of four to some extent meet the recommendations, while one in five do not meet the recommendations.

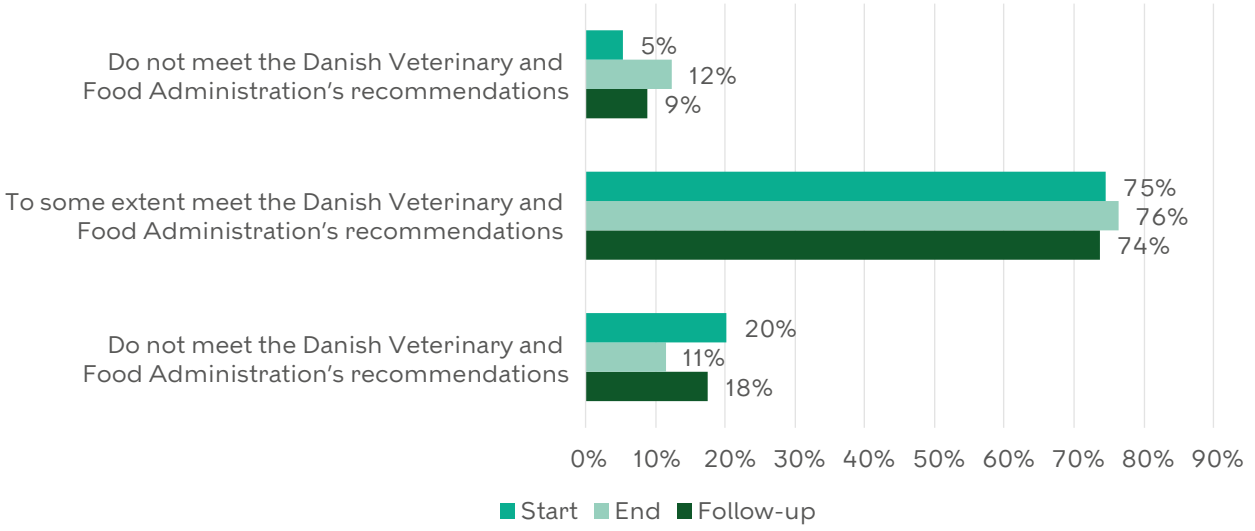
Figure 7.1 *Whether citizens meet the Danish Veterinary and Food Administration's dietary recommendations at the start of the programme (n=295)*



Development

Figure 7.2 shows whether citizens who took part in all three evaluations meet the Danish Veterinary and Food Administration's dietary recommendations. By the end of the programme, the percentage meeting, or to some extent meeting, the Danish Veterinary and Food Administration's dietary recommendations has increased, while the percentage not meeting the recommendations has decreased by just under 10 percentage points. From the end of the programme to the six-month follow-up evaluation, the percentage not meeting the Danish Veterinary and Food Administration's dietary recommendations increases, while the percentage meeting the recommendations decreases.

Figure 7.2 *Development in whether citizens meet the Danish Veterinary and Food Administration's dietary recommendations (n=114)*



The Danish Veterinary and Food Administration's dietary recommendations

Figure 7.3 describes the sociodemographic distribution of citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations at the start of the rehabilitation programme.

Centre for Diabetes: Figure 7.3 shows that at the start of the programme one in five citizens do not meet the Danish Veterinary and Food Administration's dietary recommendations.

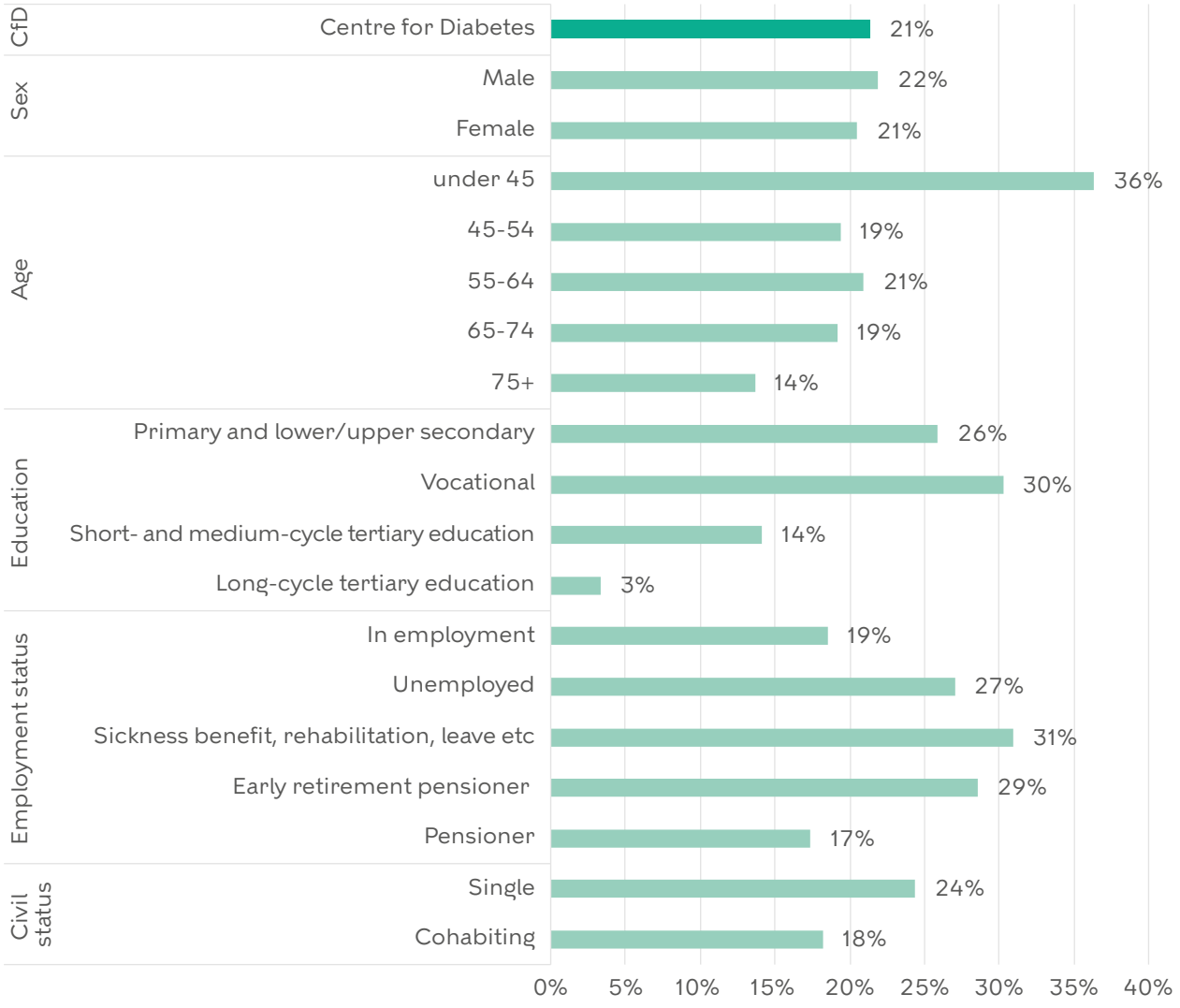
Sex and age: There is an equal distribution between men and women not meeting the recommendations. The under-45 age group has the highest percentage of citizens not meeting the recommendations, while the 75+ age group has the lowest percentage. The other age groups have an equal distribution of around one in five.

Education: There is a pronounced social gradient in the percentage of citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations. The percentage not meeting the recommendations is 10 times higher in the vocational group than in the long-cycle tertiary group, and two times higher in the primary and lower secondary/upper secondary group than in the short- or medium-cycle tertiary group. The differences are statistically significant.

Employment status: The percentage of citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations is higher among citizens of working age and capacity outside the labour market than among citizens in employment or pensioners.

Civil status: The percentage of citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations is higher among single citizens than among cohabiting citizens.

Figure 7.3 *Citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations*



7.2 Self-rated eating habits

This section describes how citizens self-rate their eating habits and whether type 2 diabetes currently has an influence on their eating pattern.

The following questionnaire items provide the basis for this section:

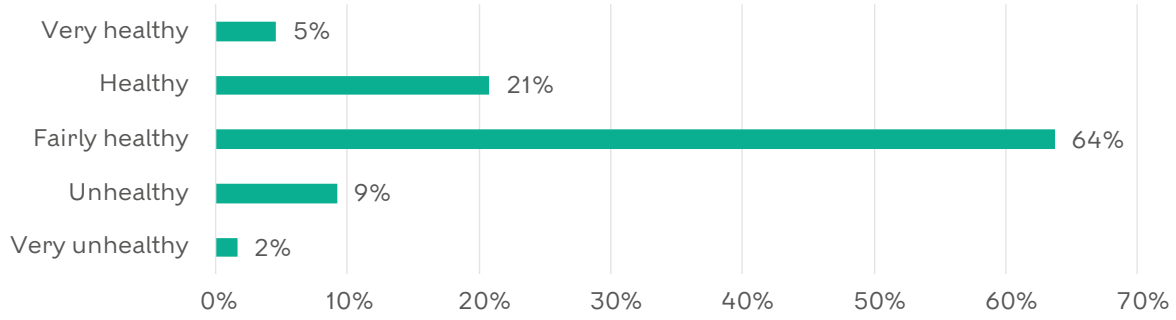
- How would you rate your eating habits overall?
- Does your diabetes currently influence how you eat?

Self-rating of eating habits

The following describes citizens' self-rating of their eating habits.

Figure 7.4 shows that at the start of the rehabilitation programme almost two out of three citizens rate their eating habits as 'fairly healthy', while one in 10 rate their eating habits as 'unhealthy' or 'very unhealthy'. A very small percentage rate their eating habits as 'very healthy'.

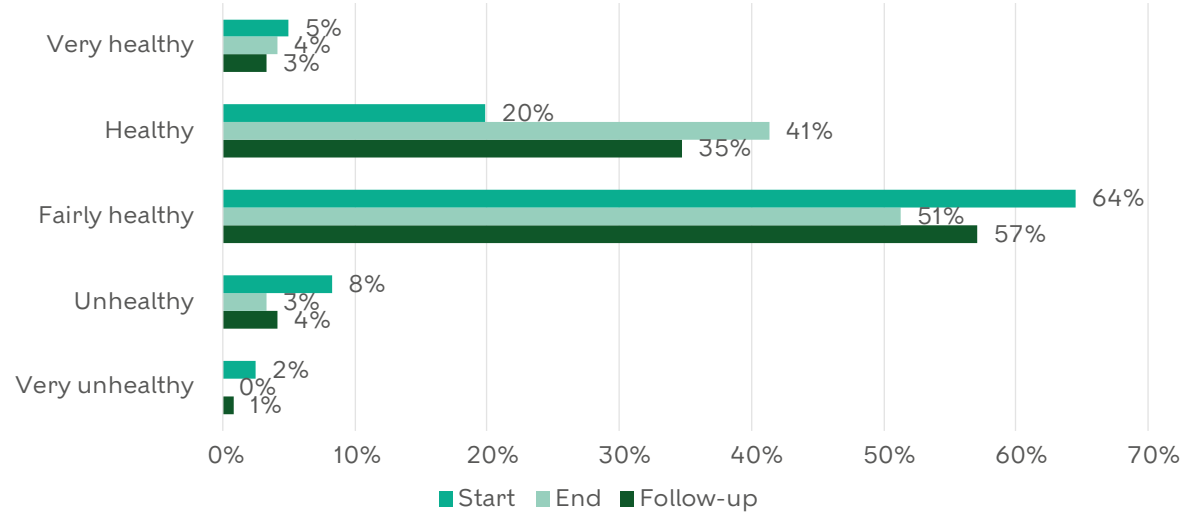
Figure 7.4 *Self-rating of eating habits (n=303)*



Development

Figure 7.5 shows the development in self-rating of eating habits among those citizens who took part in all three evaluations. Generally, there is a tendency for citizens to perceive that they have healthier eating habits after the programme than before. The percentage of citizens self-rating their eating habits as 'healthy' doubles by the end of the programme, while the percentage self-rating their eating habits as 'fairly healthy' falls to 51%. The trend towards citizens perceiving their eating habits as 'healthy' is still present six months after the end of the programme.

Figure 7.5 *Development in self-rating of eating habits (n=121)*

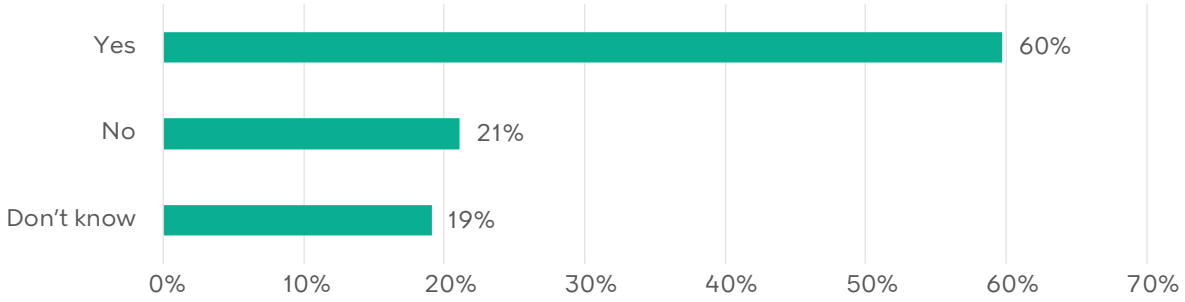


Diabetes and eating habits

The citizens were asked whether their diabetes influences how they eat.

Figure 7.6 shows that at the start of the rehabilitation programme six out of 10 citizens consider that their diabetes influences how they eat. One in five consider that their diabetes does not influence how they eat, and roughly the same proportion answer 'don't know'.

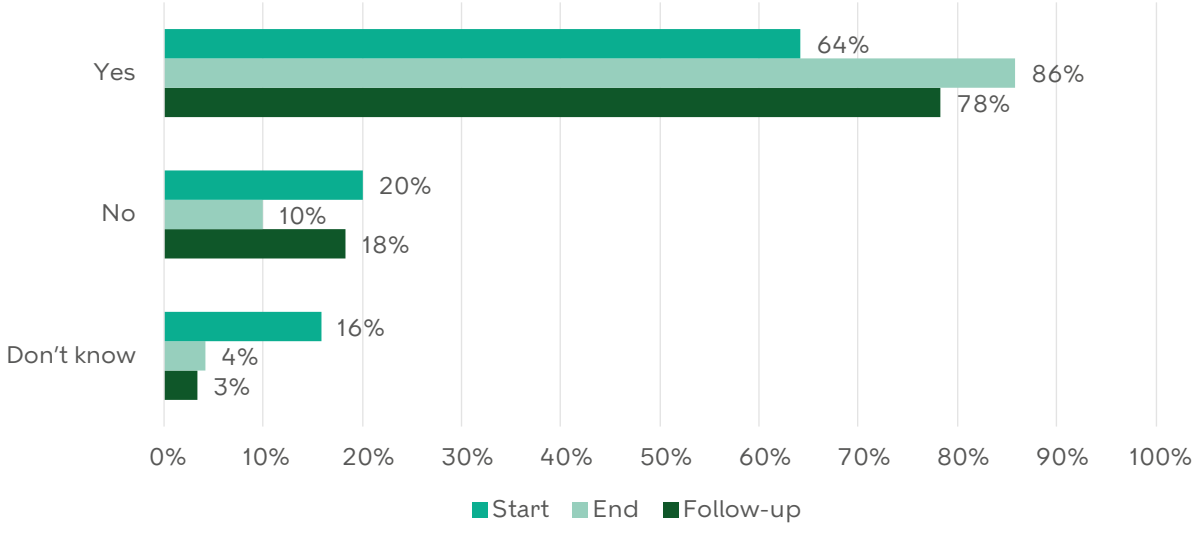
Figure 7.6 *Whether diabetes influences eating habits (n=298)*



Development

Figure 7.7 shows the development in whether diabetes influences how citizens eat among those who took part in all three evaluations. At the end of the rehabilitation programme, there is an evident increase in the percentage of citizens who consider that their diabetes influences how they eat. At the six-month follow-up evaluation, there is still an increased percentage who consider that their diabetes influences how they eat, but the figure has fallen since the end of the programme.

Figure 7.7 *Development in whether diabetes influences eating habits (n=120)*



7.3 Vegetables, fruit, fish and almonds/nuts

This section focuses on the foods that we recommend citizens should eat more of. It describes the citizens' consumption of vegetables, fruit, fish and almonds/nuts. These foods are regarded as healthy, and it is recommended that citizens should consume large amounts of them.

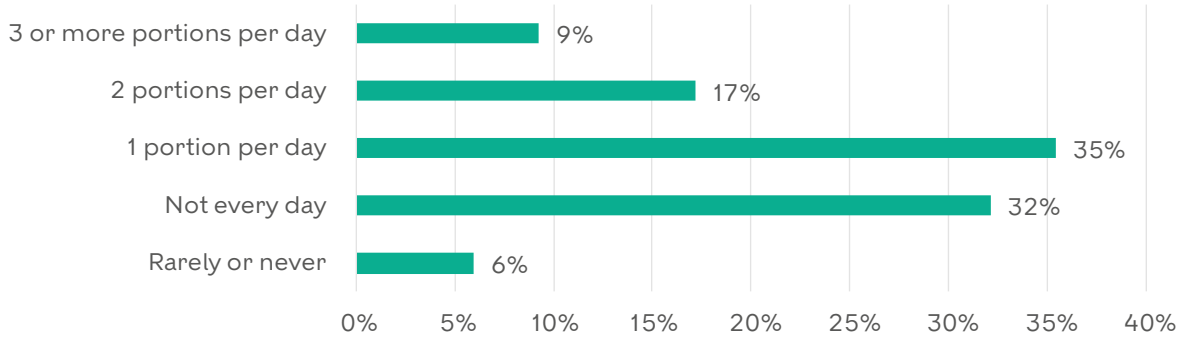
The following questionnaire items provide the basis for this section:

- **How many portions of vegetables do you eat per day?**
  (1 portion is equivalent to 1 dl or roughly a handful. In this study, 1 portion is converted to 100 g.)
- **How many portions of fruit do you usually eat per day?**
  (1 portion is equivalent to 1 piece/1 dl. Pureed/stewed fruit counts, but not dried fruit. In this study, 1 portion is converted to 100 g.)
- **How often do you eat:**
  - Fish as a sandwich filling or as a hot dish?
  - Almonds/ nuts, unsalted? *(small handful, approximately 30 g)*

Vegetables

Figure 7.8 shows that at the start of the rehabilitation programme around 60% of the citizens eat at least one portion of vegetables per day. One in three do not eat vegetables every day, and one in three eat one portion per day. These figures are in line with the overall figures for fruit and vegetables from the Health Profile 2017 [4].

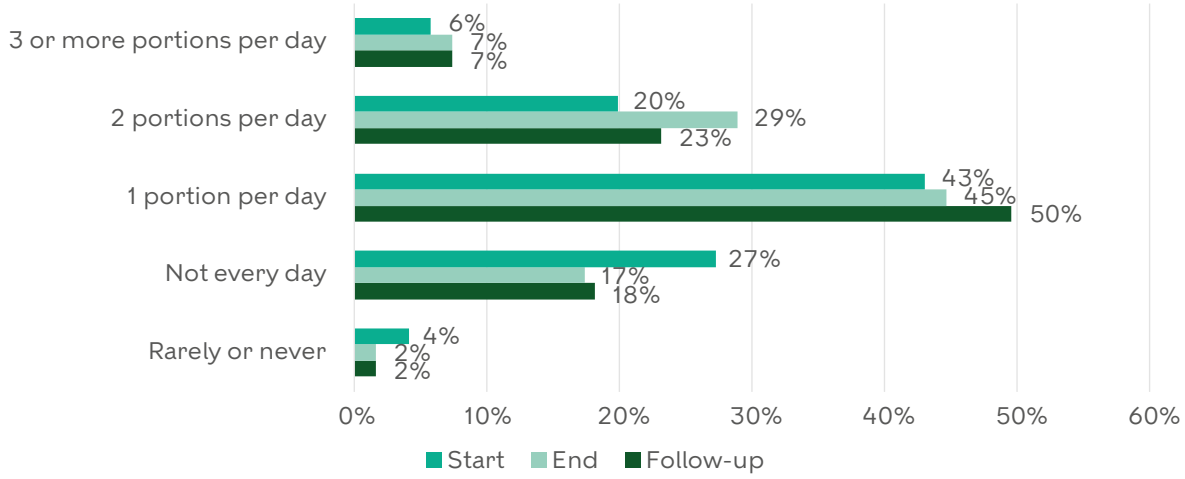
Figure 7.8 *Consumption of vegetables (n=302)*



Development

Figure 7.9 shows the development in consumption of vegetables among those citizens who took part in all three evaluations. By the end of the programme, the percentage of citizens who generally do not eat vegetables has halved. This development is maintained six months after the end of the programme. It can also be seen that the percentage of citizens eating vegetables once per day has increased by the end of the programme, and further increased by the six-month follow-up evaluation. The percentage of citizens eating vegetables twice a day has increased significantly by the end of the programme, but decreases from the end of the programme to the six-month follow-up evaluation.

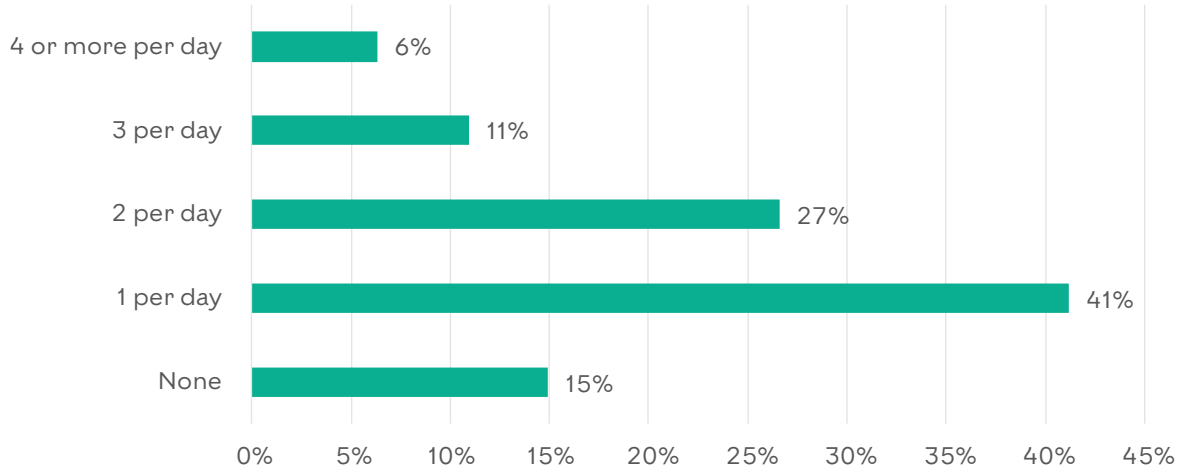
Figure 7.9 *Development in consumption of vegetables (n=121)*



Fruit

Figure 7.10 shows that at the start of the rehabilitation programme 15% of citizens never eat fruit. Four out of 10 eat one piece of fruit per day, while fewer than one in 10 eat four or more pieces per day. This is in line with the overall figures for fruit and vegetables from the Health Profile 2017 [4].

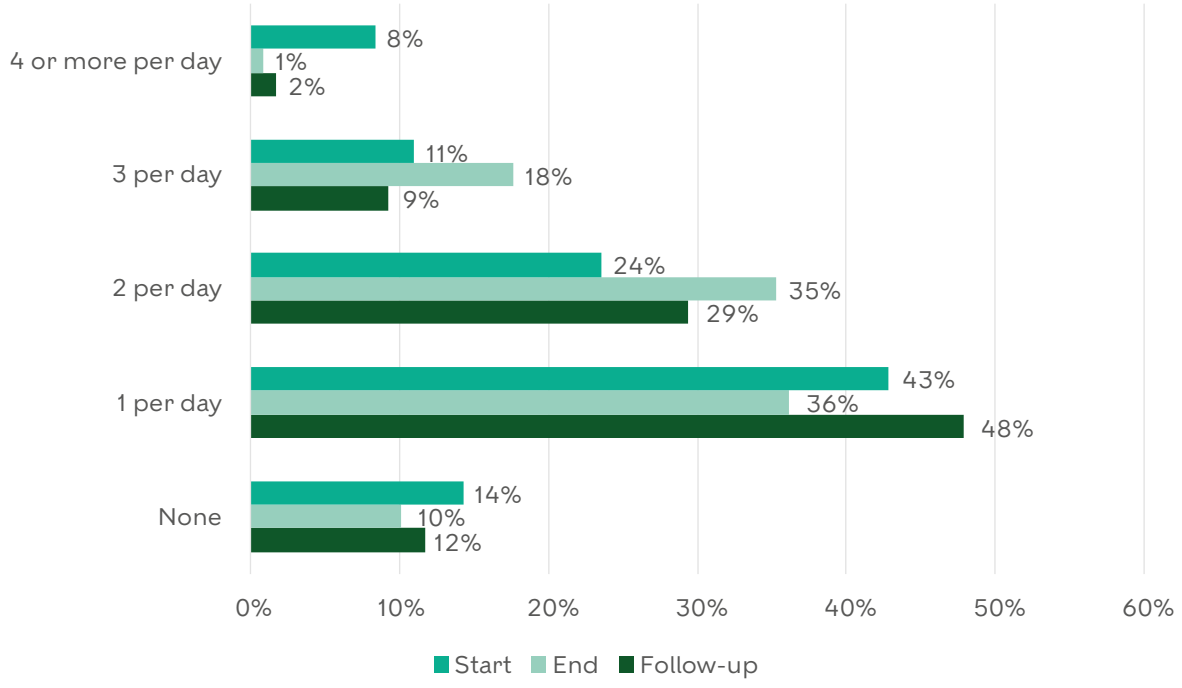
Figure 7.10 *Consumption of fruit (n=301)*



Development

Figure 7.11 shows the development in consumption of fruit among those citizens who took part in all three evaluations. The overall picture is that by the end of the programme more citizens eat one to two pieces of fruit per day and fewer eat more than three pieces per day. The percentage of citizens eating one to two pieces of fruit per day increases by 10 percentage points from the start of the programme to the six-month follow-up evaluation (from 67% to 77%). Over the same period, the percentage of citizens eating three pieces of fruit or more per day decreases by 8 percentage points (from 19% to 11%).

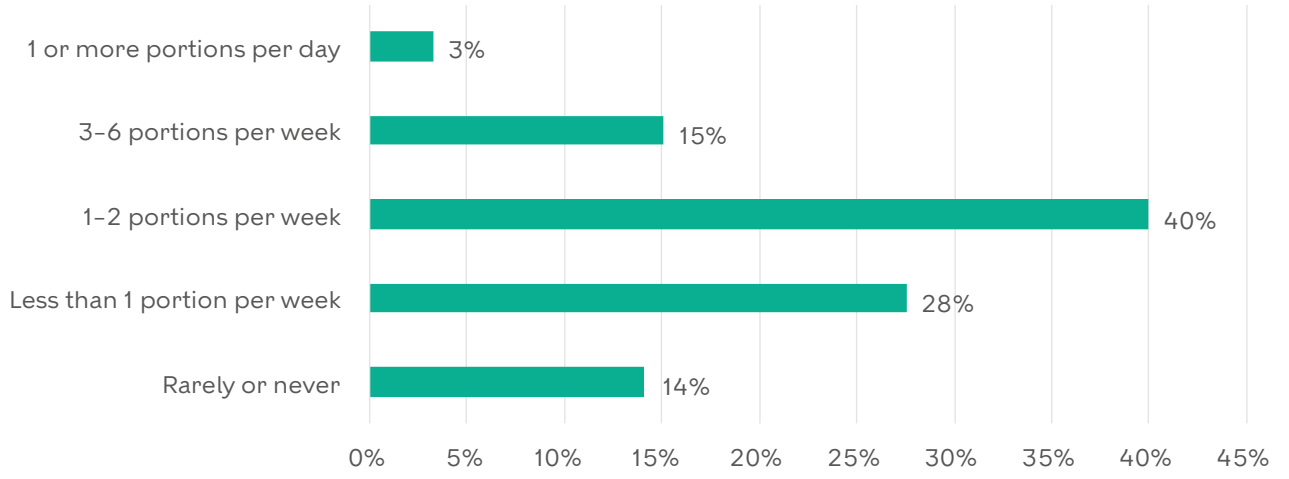
Figure 7.11 *Development in consumption of fruit (n=119)*



Fish

Figure 7.12 shows that at the start of the rehabilitation programme eight out of 10 citizens do not eat the recommended 350 g of fish per week, equivalent to less than two portions per week. This is in line with a similar assessment for fish consumption from the Health Profile 2017 [4].

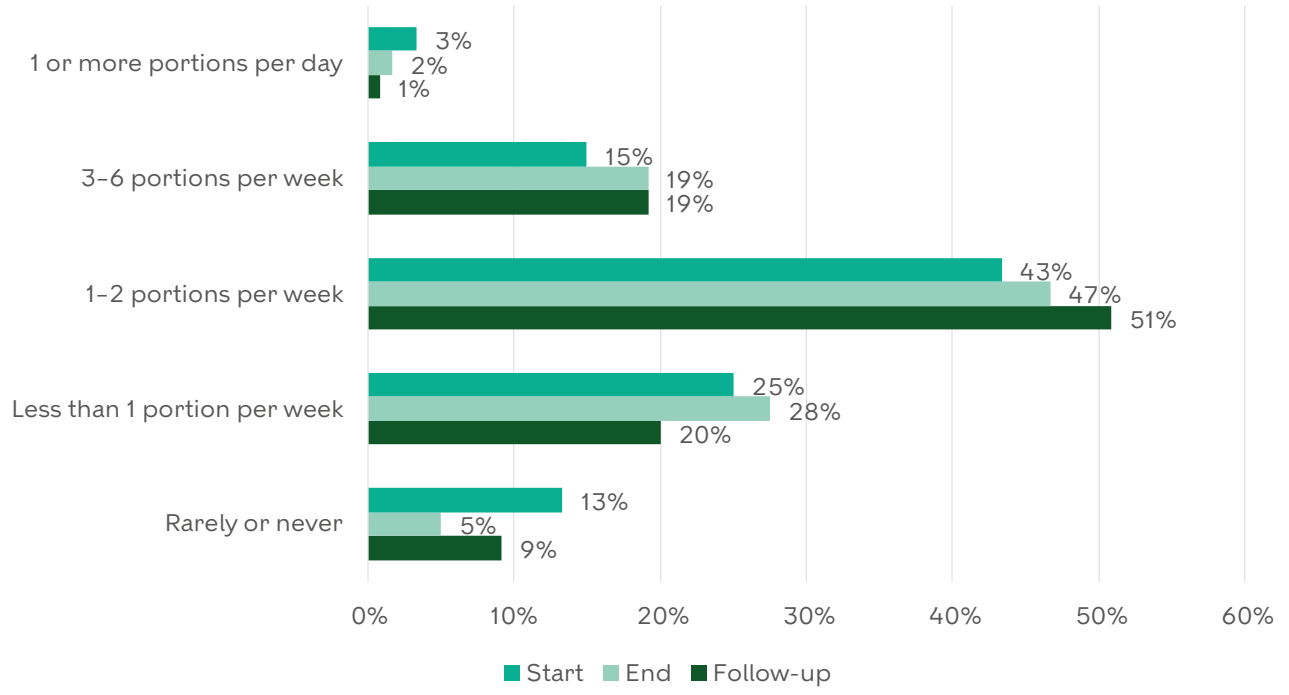
Figure 7.12 *Consumption of fish (n=305)*



Development

Figure 7.13 shows the development in consumption of fish among those citizens who took part in all three evaluations. By the end of the programme, there is an evident trend towards citizens consuming more fish than at the start. This trend is still present six months after the end of the programme among citizens eating three or more portions of fish per week and increases for citizens eating one to two portions of fish per week.

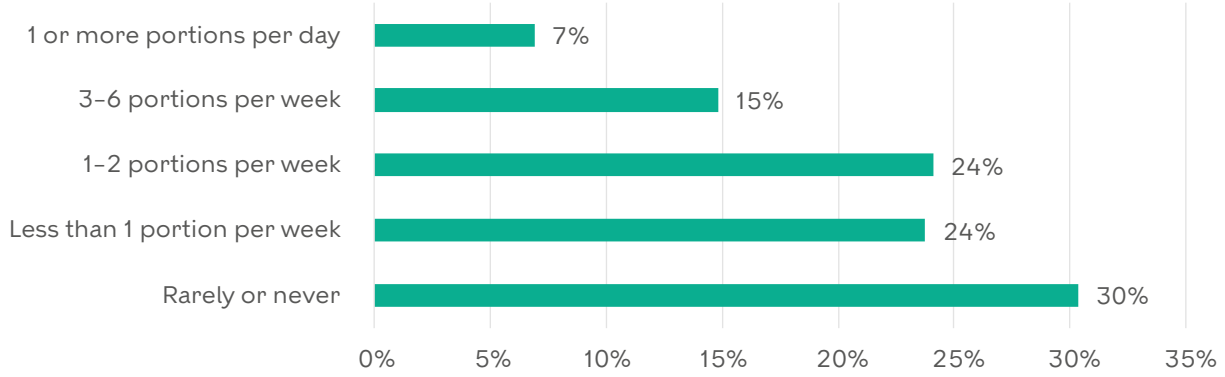
Figure 7.13 *Development in consumption of fish (n=120)*



Almonds/nuts

Figure 7.14 shows that at the start of the rehabilitation programme slightly more than one in five citizens consume three or more portions of almonds/nuts per week. Almost one in three never eat almonds/nuts.

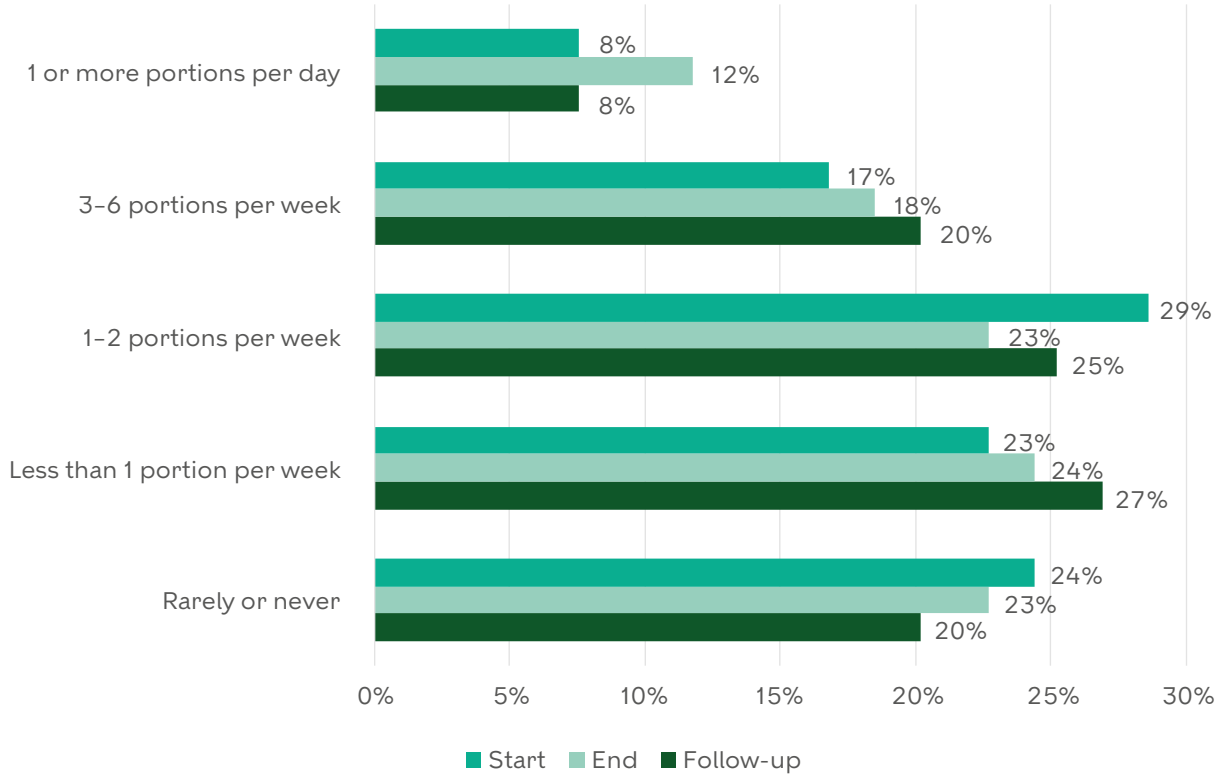
Figure 7.14 *Consumption of almonds/nuts (n=303)*



Development

Figure 7.15 shows the development in consumption of almonds/nuts among those citizens who took part in all three evaluations. Generally, there is a trend towards citizens eating more nuts/almonds by the end of the rehabilitation programme. In many of the groups, the increasing trend continues from the end of the programme to the six-month follow-up evaluation.

Figure 7.15 *Development in consumption of almonds/nuts (n=119)*



7.3 Foods recommended for limited consumption

This section describes citizens' consumption of fast food, sweets and cakes, as well as sweet drinks with or without added sugar. These are foods that are regarded as inappropriate for consumption in large amounts. They do not contribute to a healthy lifestyle, neither in terms of preventing disease nor in terms of living well with type 2 diabetes.

The following questionnaire item provides the basis for this section:

How often do you eat or drink the following?

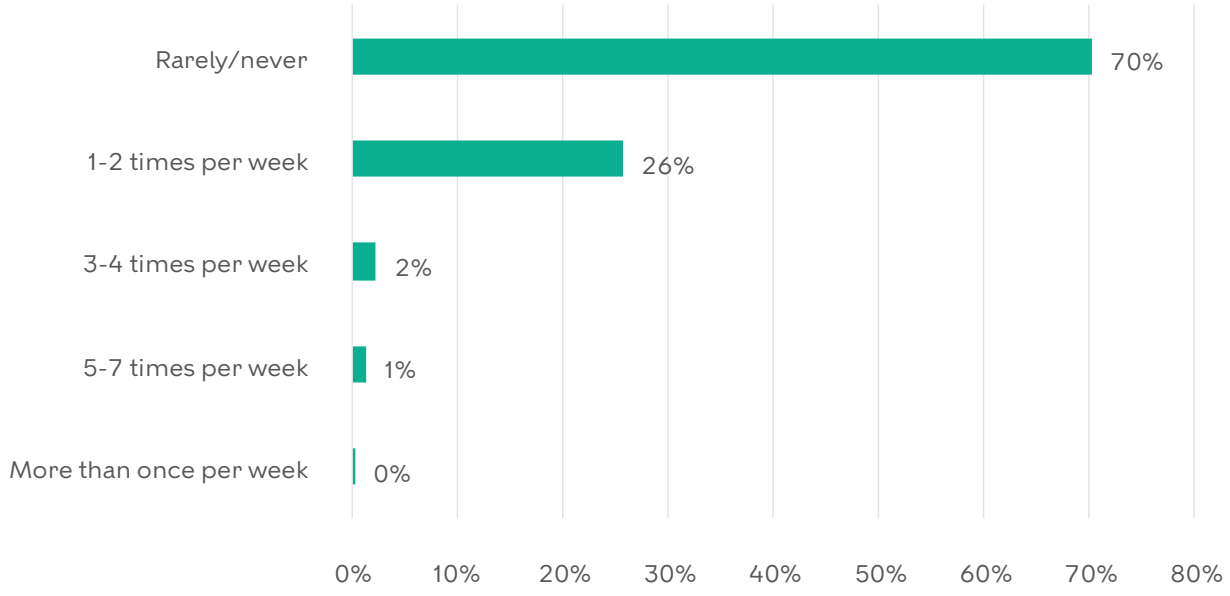
- Food from pizzerias, burger bars, kebab shops etc.

Fast food

Fast food includes ready meals, which are characterised by a large proportion of the energy content coming from saturated fat and easily accessible carbohydrate. At the same time, this food usually has a high content of salt and a low content of fruit, vegetables and dietary fibre. Fast food mainly comprises food from pizzerias, burger bars, kebab shops etc. It is recommended that a maximum of 10% of a person's daily energy intake should come from saturated fat, and consumption of these foods should therefore be kept to a minimum[5].

Figure 7.16 shows that at the start of the rehabilitation programme seven out of 10 citizens rarely or never eat fast food, while around one in three eat fast food at least once per week. 3% eat fast food at least three times per week and up to seven times per week. One-third eat fast food at least once per week. These figures are in line with those from the Health Profile 2017[4].

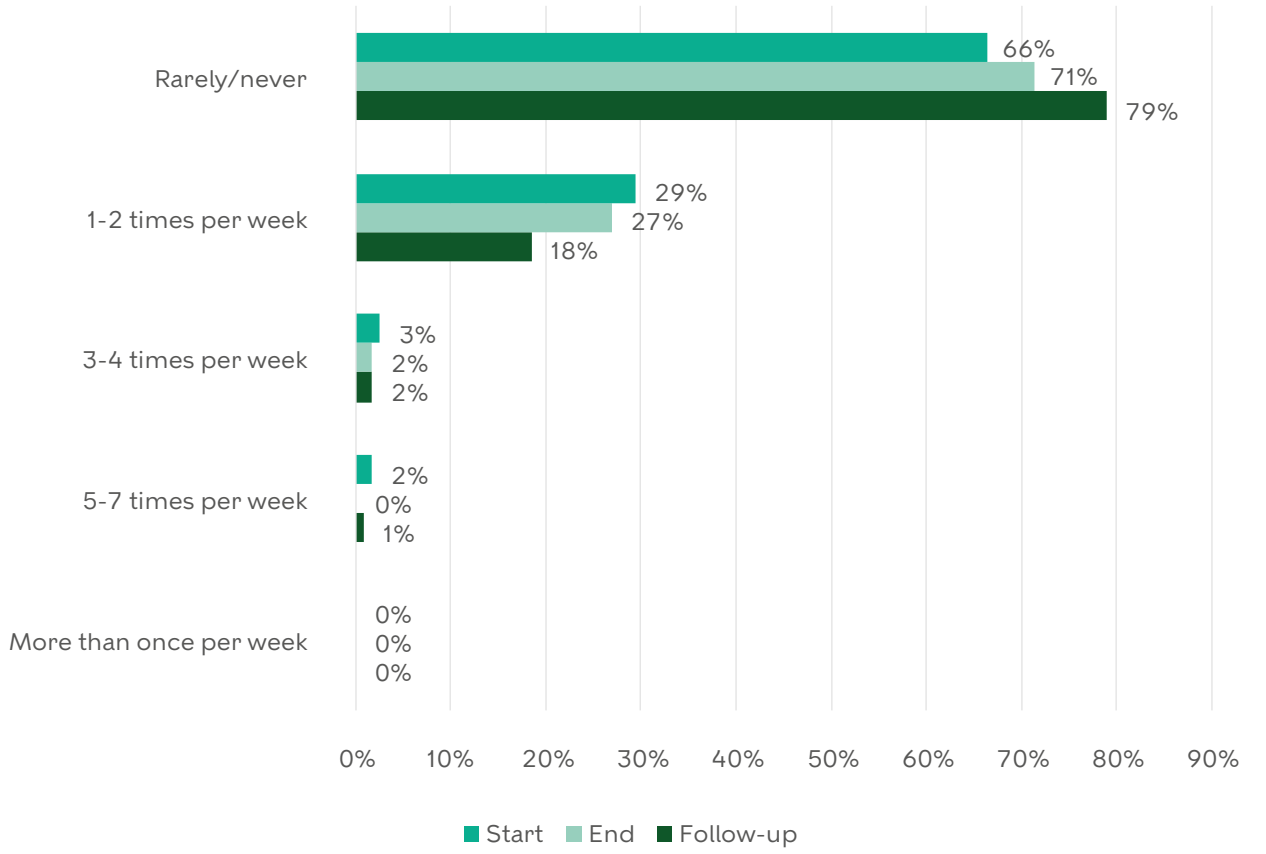
Figure 7.16 *Consumption of food from pizzerias, burger bars, kebab shops etc (n=303)*



Development

Figure 7.17 shows the development in consumption of food from pizzerias, burger bars, kebab shops etc among those citizens who took part in all three evaluations. The percentage of citizens who rarely or never eat fast food increases from the start of the rehabilitation programme to the end, and this increase continues up to the six-month follow-up evaluation. Conversely, there is a decrease in the percentage of citizens eating fast food one to two times per week.

Figure 7.17 *Development in consumption of food from pizzerias, burger bars, kebab shops etc (n=119)*



Sweets and cakes

The Danish Health Authority recommends that people with type 2 diabetes should consume no more than 25–30 g of sugar daily, and that the sugar intake should be spread across meals with no more than 5 g of sugar at a time. The Danish Veterinary and Food Administration also advises that most people could benefit from halving their consumption of sweets and cakes, and restricting these foods to special occasions and weekends[2].

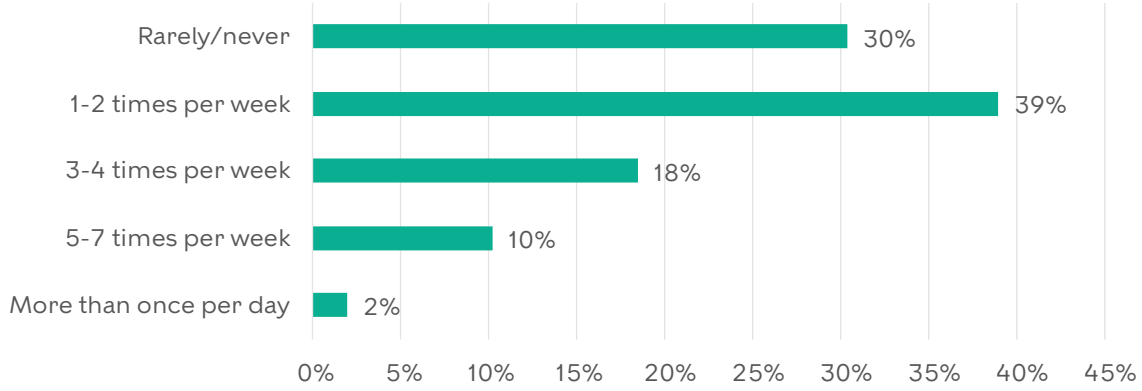
The following questionnaire item provides the basis for this section:

How often do you eat or drink the following?

- Cakes, chocolate, ice cream and sweets
- Fizzy drinks, cola, energy drinks, juice etc with added sugar
- Fizzy drinks, cola, energy drinks, juice etc without added sugar

Figure 7.18 shows that at the start of the rehabilitation programme one in three citizens rarely or never eat cakes, chocolate, ice cream and sweets. One in three eat these foods three times per week or more, with one in 10 eating them at least five times per week. These figures are in line with those of the Health Profile 2017[4].

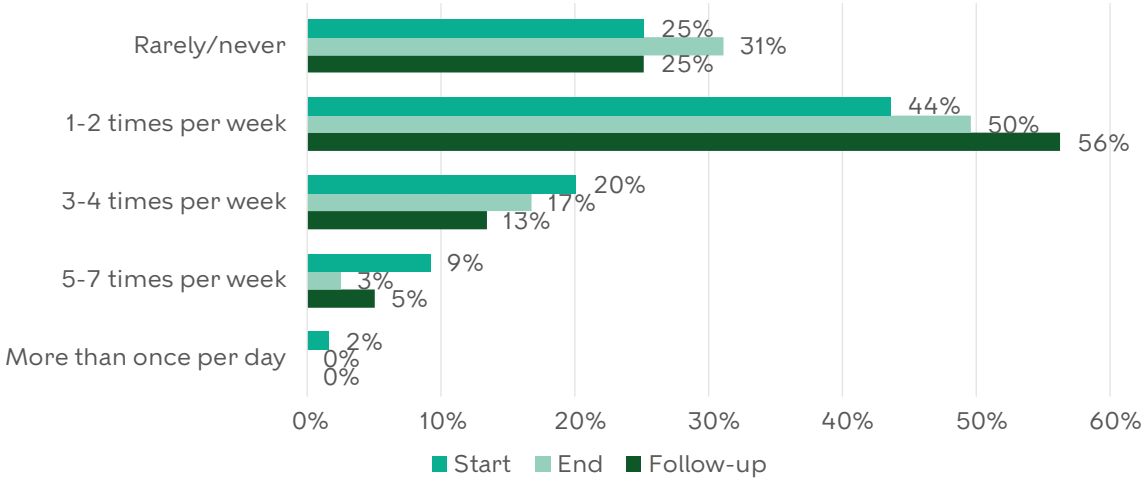
Figure 7.18 *Consumption of cakes, chocolate, ice cream and sweets (n=303)*



Development

Figure 7.19 shows the development in consumption of cakes, chocolate, ice cream and sweets among those citizens who took part in all three evaluations. The percentage who rarely or never eat these foods remains unchanged from the start of the programme through to the six-month follow-up evaluation, while there is an increase in the percentage who eat these foods one to two times per week. The percentage who eat cakes, chocolate, ice cream and sweets three to four times per week decreases correspondingly.

Figure 7.19 *Development in consumption of cakes, chocolate, ice cream and sweets (n=119)*

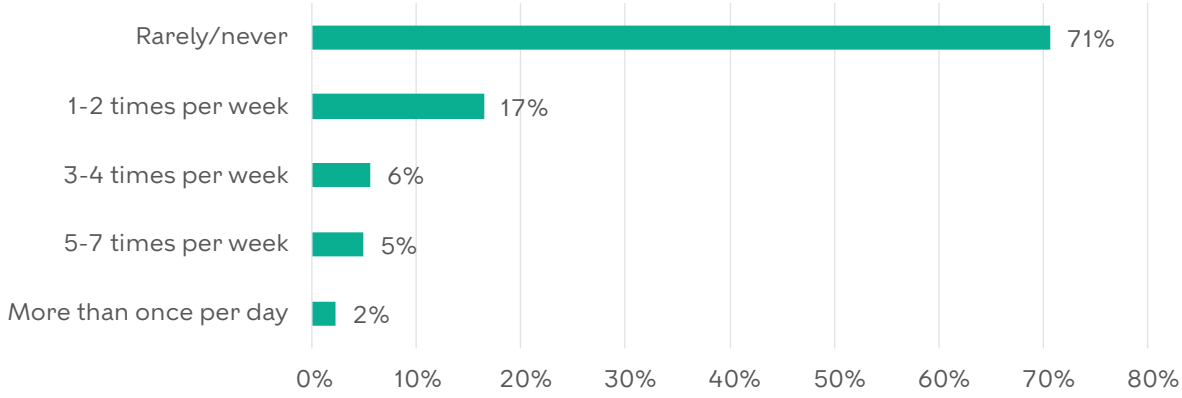


Fizzy drinks with added sugar

The Danish Veterinary and Food Administration recommends that consumption of sugar-sweetened drinks should not exceed 0.5 litres per week. Due to the high content of carbohydrates in these types of drink, citizens with diabetes are advised to consider which drinks they choose if they want to maintain stable blood sugar levels[6].

Figure 7.20 shows that at the start of the rehabilitation programme nine out of 10 citizens consume sugar-sweetened drinks a maximum of two times per week and therefore meet the recommendations. This is in line with the figures from the Health Profile 2017[4].

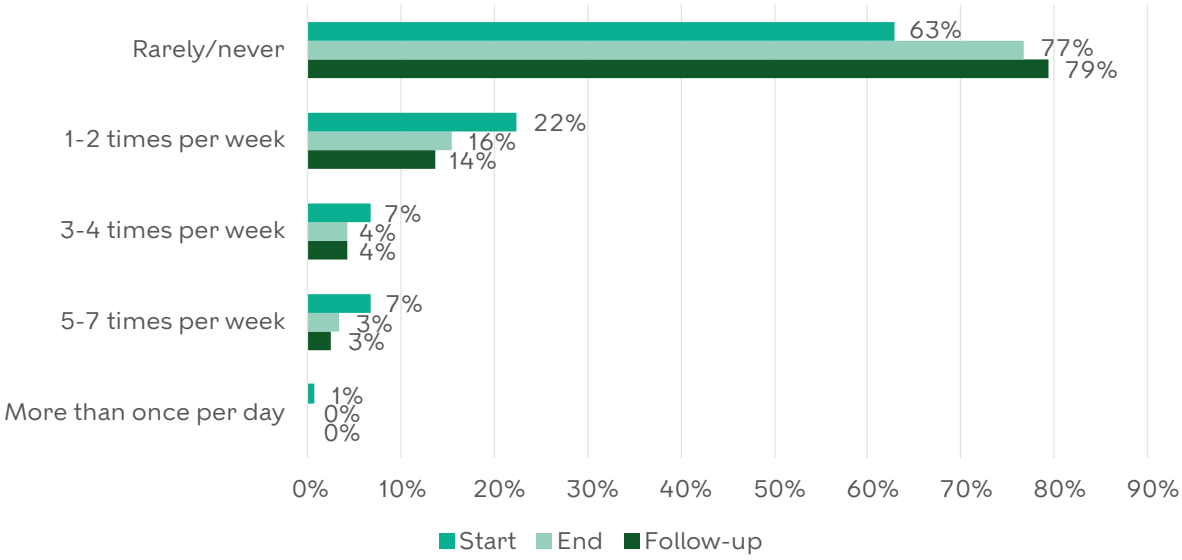
Figure 7.20 *Consumption of fizzy drinks, cola, energy drinks, juice etc **with** added sugar (n=303)*



Development

Figure 7.21 shows the development in consumption of fizzy drinks, cola, energy drinks, juice etc with added sugar among those citizens who took part in all three evaluations. Generally, there is a trend for citizens to drink fewer sugar-sweetened drinks at the end of the programme and at the six-month follow-up evaluation. At the end of the rehabilitation programme, there are more citizens who rarely or never consume sugar-sweetened drinks, and the increase continues through to the six-month follow-up evaluation.

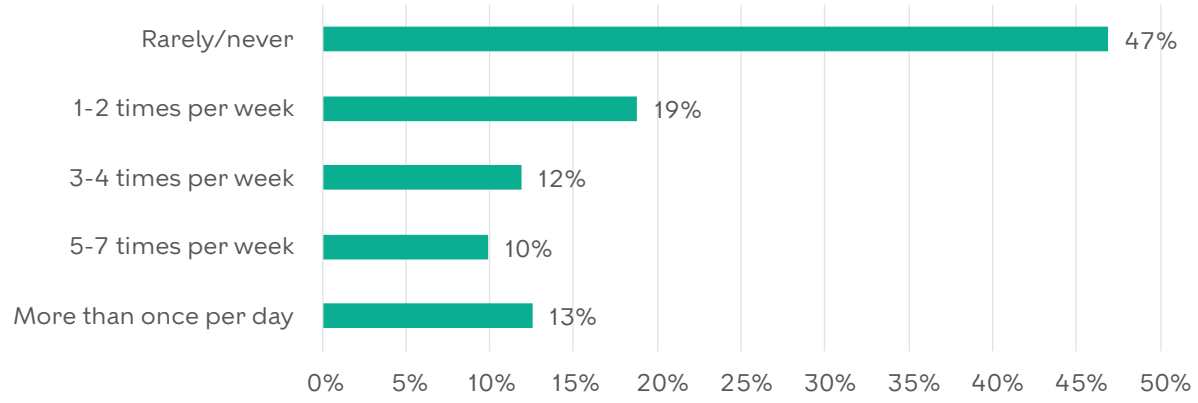
Figure 7.21 *Development in consumption of fizzy drinks, cola, energy drinks, juice etc **with** added sugar (n=116)*



Fizzy drinks without added sugar

Figure 7.22 shows that at the start of the rehabilitation programme around half of citizens rarely or never drink unsweetened fizzy drinks, cola, energy drinks, juice etc. Just under one in four drink unsweetened drinks at least five times per week. The Health Profile 2017 did not assess fizzy drinks without sugar[4].

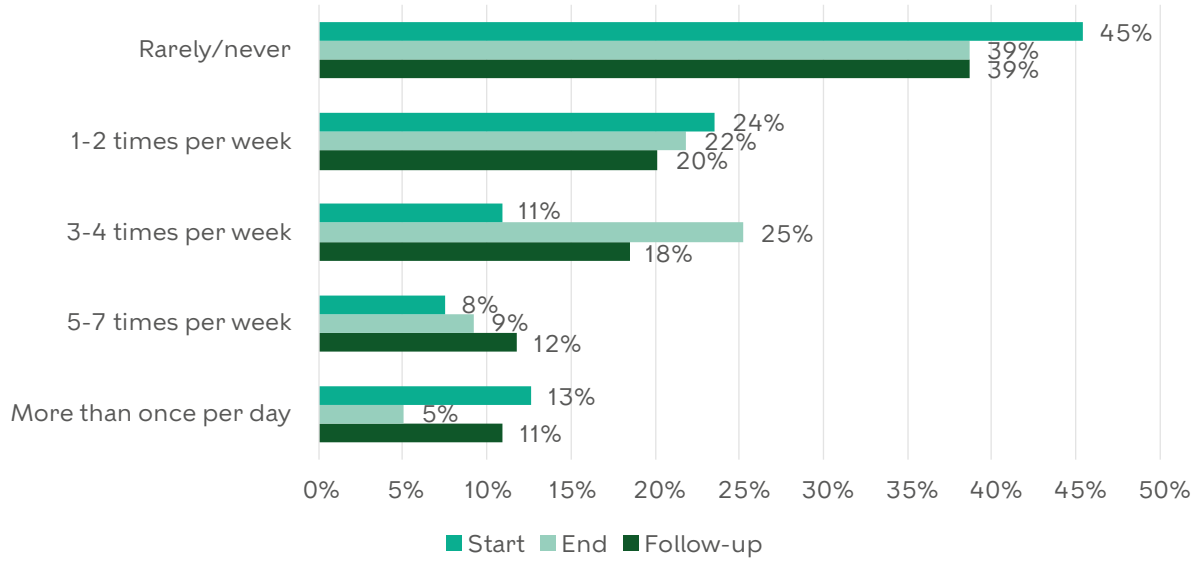
Figure 7.22 *Consumption of fizzy drinks, cola, energy drinks, juice etc **without** added sugar (n=303)*



Development

Figure 7.23 shows the development in consumption of fizzy drinks, cola, energy drinks, juice etc without added sugar among those citizens who took part in all three evaluations. At the end of the programme and at the six-month follow-up evaluation, there is a trend for a higher percentage of citizens to drink unsweetened drinks more often.

Figure 7.23 *Development in consumption of fizzy drinks, cola, energy drinks, juice etc **without** added sugar (n=119)*



7.4 Citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations combined with other risk factors

Table 7.24 shows the distribution of selected risk factors between citizens meeting and citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations relating to consumption of vegetables, fruit, fish and almonds/nuts at the start of the rehabilitation programme.

Table 7.24 shows that the percentage of citizens with short/long sleep length is twice as high among citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations. In that group of citizens, just over 20% more citizens self-rate their physical condition as 'fair' or 'poor' and show signs of high alcohol consumption compared with citizens meeting, or to some extent meeting, the recommendations.

There is also a trend for more citizens not meeting the recommendations to have 'fair' or 'poor' self-rated health and to smoke more compared with those meeting, or to some extent meeting, the recommendations.

Table 7.24 *Incidence of selected risk factors among citizens not meeting and citizens meeting, or to some extent meeting, the Danish Veterinary and Food Administration's dietary recommendations*

	Not meeting the recommendations, %	Meeting, or to some extent meeting, the recommendations, %
'Fair' or 'poor' self-rated health	66.7	53.0
Obesity (BMI ≥ 30)	69.8	64.9
Daily smoking	33.3	21.6
Not meeting WHO's recommendations for physical activity	75.8	69.7
'Fair' or 'poor' self-rated physical condition	70.5*	53.9
Short/long sleep length	31.6*	18.7
Signs of high alcohol consumption	54.2*	35.6

* *Statistically significant between-groups difference.*

7.5 Motivation to change eating habits

This section concerns citizens' motivation to change their eating habits.

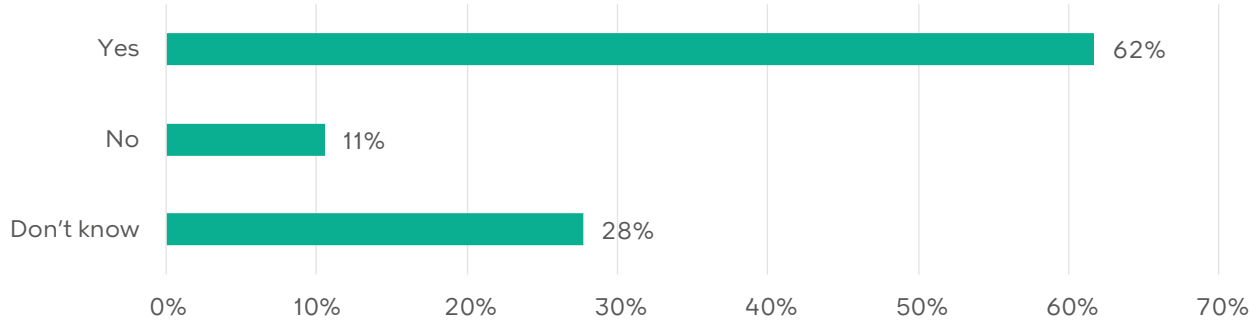
The following questionnaire item provides the basis for this section:

- Do you want to change your current eating habits?

Desire to change eating habits

Figure 7.25 shows that at the start of the rehabilitation programme six out of 10 citizens want to change their eating habits. One in 10 do not want to change their eating habits, and just under one in three are uncertain about this question.

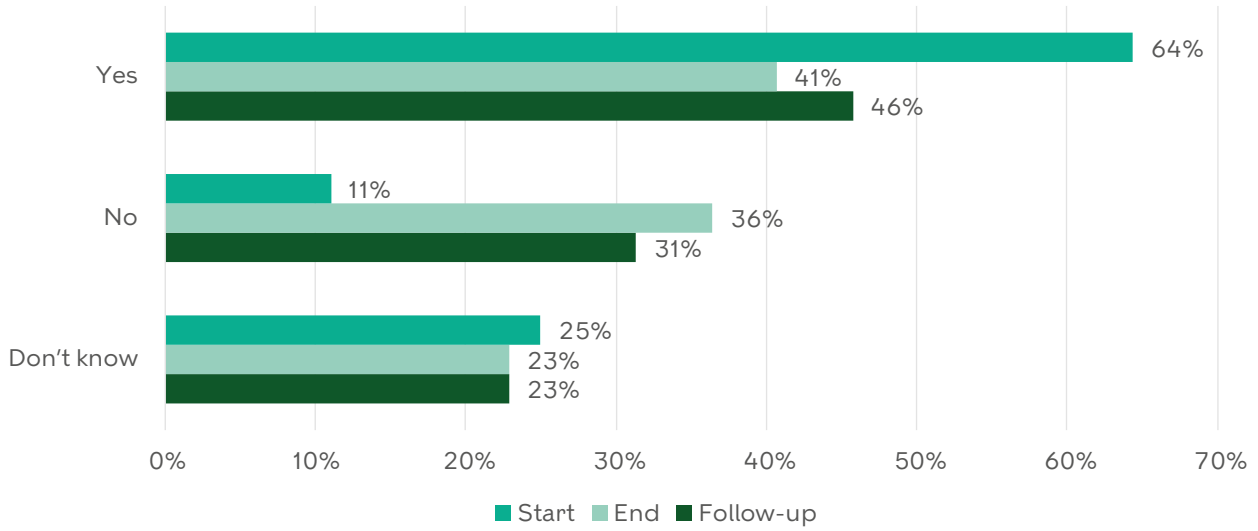
Figure 7.25 *Desire to change eating habits (n=303)*



Development

Figure 7.26 shows the development in whether citizens want to change their eating habits among those who took part in all three evaluations. By the end of the rehabilitation programme, there is a significant decrease in the percentage who want to change their eating habits and a clear increase in the percentage who do not want to change their eating habits. The percentage answering 'don't know' is almost unchanged. The same trend is still present six months after the end of the programme.

Figure 7.26 *Development in desire to change eating habits (n=118)*



7.6 Selected reflections on own eating habits

The table below shows reflections on own eating habits among citizens meeting and citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations.

Table 7.27 shows that among citizens not meeting the Danish Veterinary and Food Administration's dietary recommendations, 6% rate their eating habits as 'healthy' or 'very healthy'. Among citizens meeting, or to some extent meeting, the recommendations, five times as many rate their eating habits as 'healthy' or 'very healthy'. The difference is statistically significant.

Among citizens not meeting the Danish Veterinary and Food Administration's recommendations, just under half say that their diabetes influences how they eat. Among citizens meeting, or to some extent meeting, the recommendations, the figure is six out of 10. The difference is statistically significant.

Table 7.27 *Selected reflections on own eating habits*

	Not meeting the recommendations, %	Meeting, or to some extent meeting, the recommendations, %
'Very healthy' or 'healthy' self-rated eating habits	6.3*	30.9
Want to change current eating habits	69.8	59.9
Yes, diabetes influences how I eat	46.0*	64.4

**Statistically significant between-groups difference.*

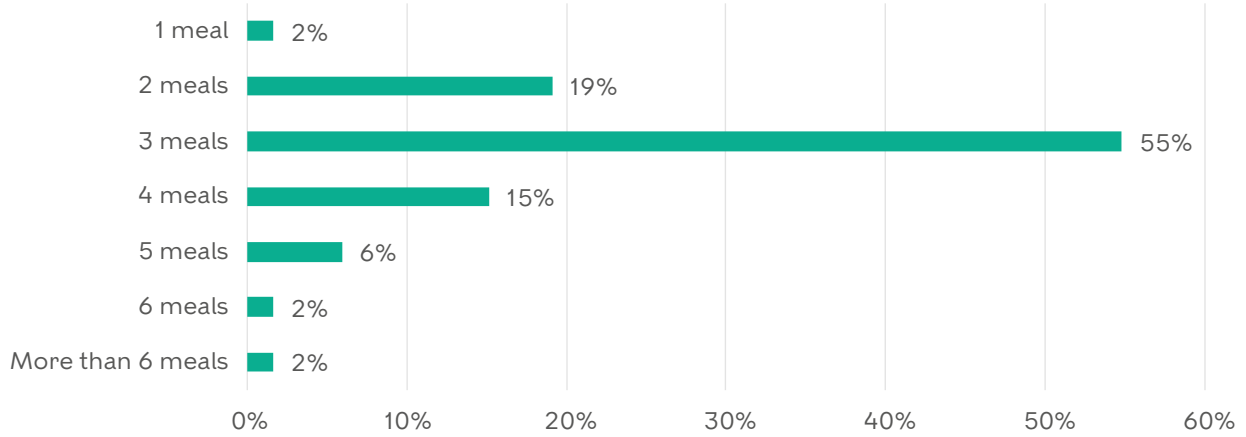
7.7 Number of meals

The following questionnaire item provides the basis for this section:

- How many times a day do you normally eat?

Figure 7.28 shows that at the start of the rehabilitation programme slightly more than half of the citizens eat three meals per day, one in five eat twice per day and a very small percentage eat once a day. One in four eat four or more meals per day.

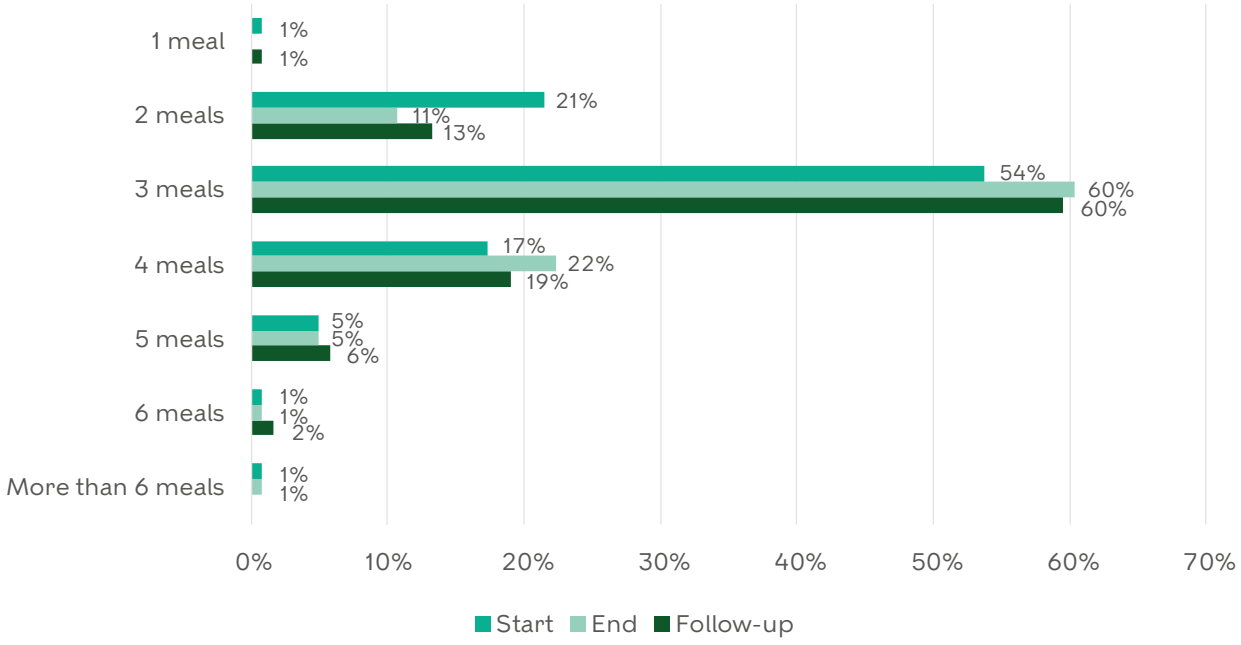
Figure 7.28 *Number of meals per day (n=303)*



Development

Figure 7.29 shows the development in number of meals per day among those citizens who took part in all three evaluations. There is a decrease in the percentage who eat two meals per day and a small increase in the percentage who eat three meals per day. The same trend is maintained from the end of the programme to the six-month follow-up evaluation.

Figure 7.29 *Development in number of meals per day (n=121)*



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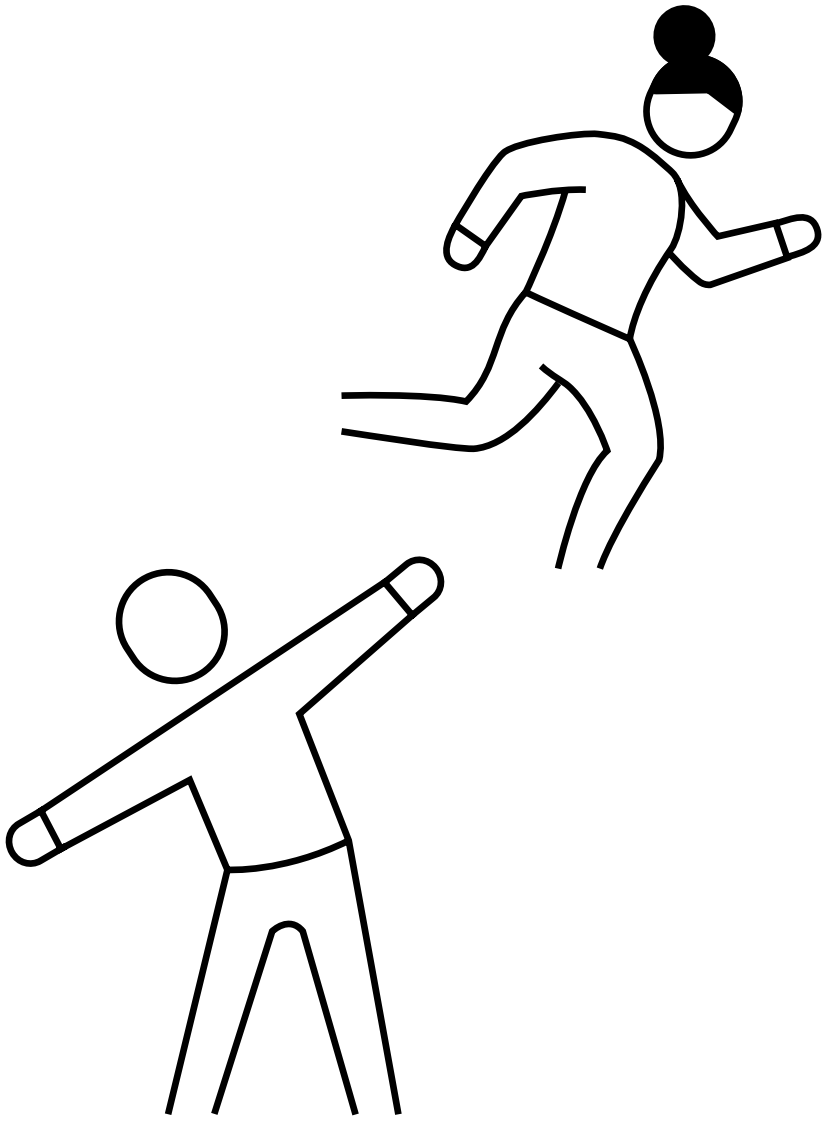


8
PHYSICAL ACTIVITY

8 Physical activity

- From the baseline measurement to the final measurement, the percentage of citizens spending more than 150 minutes per week doing everyday activities rises from 30% to 40%.
- Three out of four citizens do not meet WHO's recommendation to perform ≥ 150 minutes of moderate-intensity physical activity per week.
- From the baseline measurement to the follow-up measurement, the proportion of citizens who do not achieve an increased heart rate at any time during the course of a week (0 minutes) decreases, from 25% down to 5%.
- At the start of the programme, slightly more than half of citizens get out of breath for less than 30 minutes per week and thus fail to meet the Danish Health Authority's recommendation to engage in physical activity of vigorous intensity at least twice a week for at least 20 minutes.
- At the start of the programme, one in three citizens self-rate their physical condition as poor. By the end of the programme, this has fallen to 6%.
- At the start of the programme, three out of four citizens want to be more physically active.

Introduction

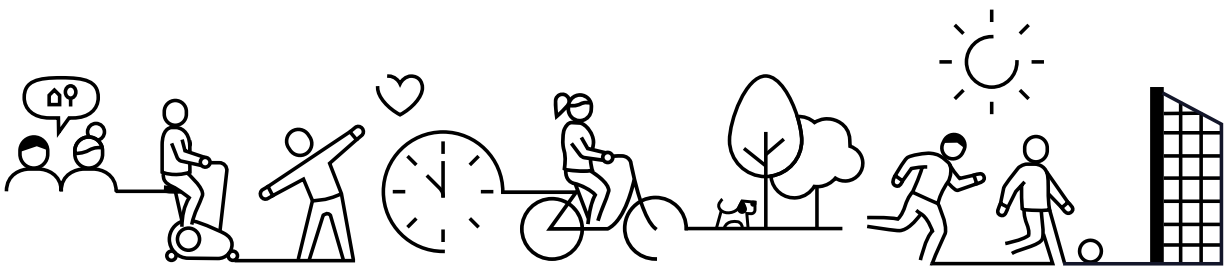
Physical activity prevents early death and improves health by averting the development and worsening of a large number of diseases[1]. Regular physical activity not only extends the individual citizen's life span but also their time spent in good health. This is manifest in, among other things, a reduction in the age-related decrease in physical functioning. The preventive effect of physical activity is therefore of significant benefit both for the individual and for society as a whole, because the consequences of physical inactivity entail high costs for treatment and care. These can be avoided if more people are physically active[2].

Physical activity includes all exercise, including both unstructured activity and more deliberate, goal-oriented and regular physical training. The definition of physical activity is therefore broad, encompassing everything from sport and vigorous exercise to everyday activities such as gardening, walking, cycling as a means of transport and taking the stairs[3].

For people with type 2 diabetes, physical activity is a recommended part of treatment, because it has the following effects[4]:

- It increases the insulin sensitivity of cells, improving the body's ability to take sugar from the blood.
- It reduces the blood sugar level, which is an important regulator for type 2 diabetes.
- It prevents comorbidities.
- It maintains and increases muscle mass.
- It strengthens the heart and circulation.
- It increases mental and physical well-being.

This chapter describes citizens' time spent on everyday activities and on activities that get them out of breath, as well as time spent on sedentary activity. It also focuses on citizens' self-rated physical condition and whether they want to be more physically active.



8.1 Everyday activities

Everyday activities are important for maintaining the body's physical functioning, especially if it is not possible to perform physical activity with an increased heart rate. Examples of moderate-intensity everyday activities are[4]:

- Gardening
- Walking
- Taking the stairs instead of the lift or escalator
- Cycling as a means of transport
- Cleaning

WHO's recommendations for adults over 18 with chronic conditions:

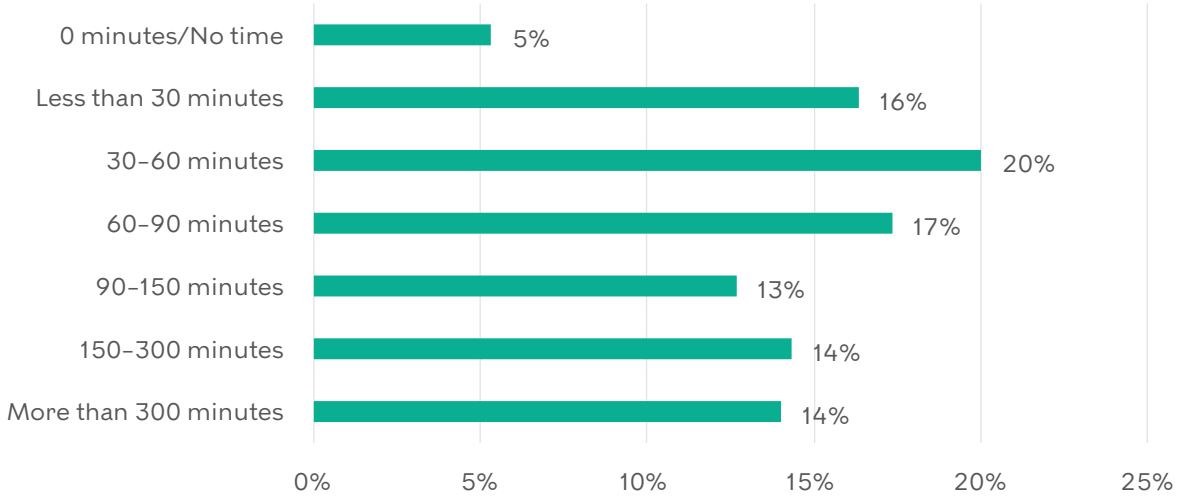
- All adults with chronic conditions should undertake regular physical activity.
- Adults with chronic conditions should do at least 150–300 minutes of moderate-intensity aerobic physical activity; or at least 75–150 minutes of vigorous-intensity aerobic physical activity; or an equivalent combination of moderate- and vigorous-intensity activity throughout the week.
- Adults with chronic conditions should also do muscle-strengthening activities at moderate or greater intensity that involve all major muscle groups on two or more days a week.
- Older adults with chronic conditions should do varied multicomponent physical activity that emphasises functional balance and strength training at moderate or greater intensity on three or more days a week.
- When not contraindicated, adults with chronic conditions may increase the quantity of training[5].

One of WHO's physical activity recommendations for adults over 18 is therefore at least 150 minutes of moderate-intensity physical activity or at least 75 minutes of vigorous-intensity physical activity throughout the week. If the activity is divided up, each session should last at least 10 minutes[5]. These recommendations are general across sex and social class.

It is well known, however, that there is a degree of social inequality in physical activity. This means that the higher a person's socioeconomic status, the greater their possibility of meeting the recommendations for physical activity, partly due to a stronger connection with structured physical activity and participation in clubs and associations[6].

Figure 8.1 shows that at the start of the rehabilitation programme the citizens are physically active to a minor extent in relation to everyday activities. One in five are active in relation to everyday activities for less than 30 minutes per week. By contrast, just over one in four are active in relation to everyday activities for more than 150 minutes per week.

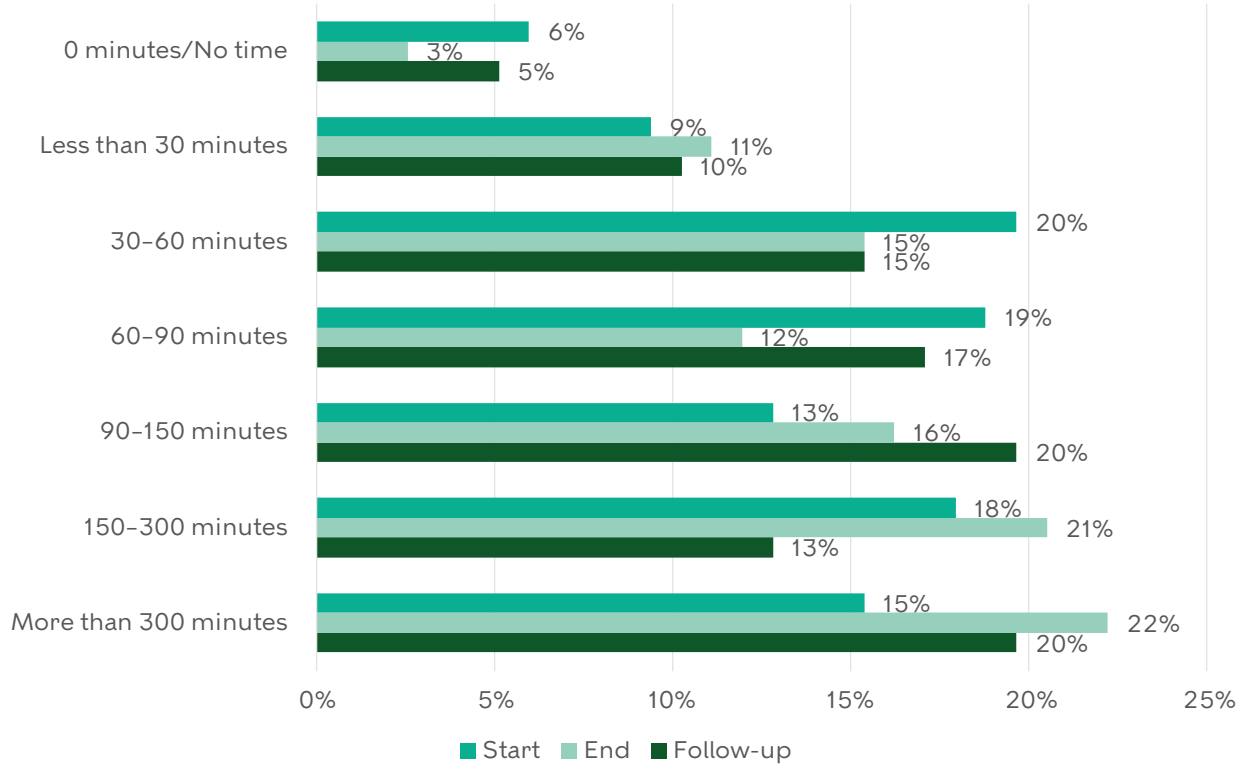
Figure 8.1 *Everyday activities, number of minutes per week (n=300)*



Development

Figure 8.2 shows the development in everyday activities among those citizens who took part in all three evaluations. By the end of the rehabilitation programme, more citizens are physically active in relation to everyday activities. The percentage of citizens who are physically active for 90 minutes or more per week increases, while the percentage who are physically active for less than 90 minutes per week decreases. Six months after the end of the programme, this development has reversed significantly.

Figure 8.2 *Development in everyday activities (n=117)*



8.2 WHO's minimum recommendations for physical activity

The following questionnaire item provides the basis for this section

- In a typical week, how much time do you spend doing everyday activities such as walking, cycling or gardening?

The following section describes the extent to which the citizens meet WHO's recommendation of ≥ 150 minutes per week of moderate-intensity physical activity. The citizens are divided into two categories:

- Citizens who meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity
- Citizens who do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity.

Figure 8.3 below shows the sociodemographic distribution of citizens who do not meet WHO's physical activity recommendation.

Centre for Diabetes: 72% of the citizens at the Centre for Diabetes do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity. This is significantly higher than the figure from the Health Profile 2017, where 26% of the residents of the Capital Region of Denmark do not meet WHO's minimum recommendation [2].

Sex: More men than women do not meet WHO's minimum recommendation for moderate-intensity physical activity.

Age: The percentage of citizens who do not meet WHO's minimum recommendation of ≥ 150 minutes

of moderate-intensity physical activity increases with increasing age. In the under 45 age group, slightly more than half of the citizens do not meet the minimum recommendation, while almost no one in the 75+ age group meets the recommendation. This represents a statistically significant difference.

The same trend is evident in the Health Profile 2017, but the percentage of citizens who do not meet WHO's minimum recommendation is higher in the impact evaluation than in the Health Profile[2].

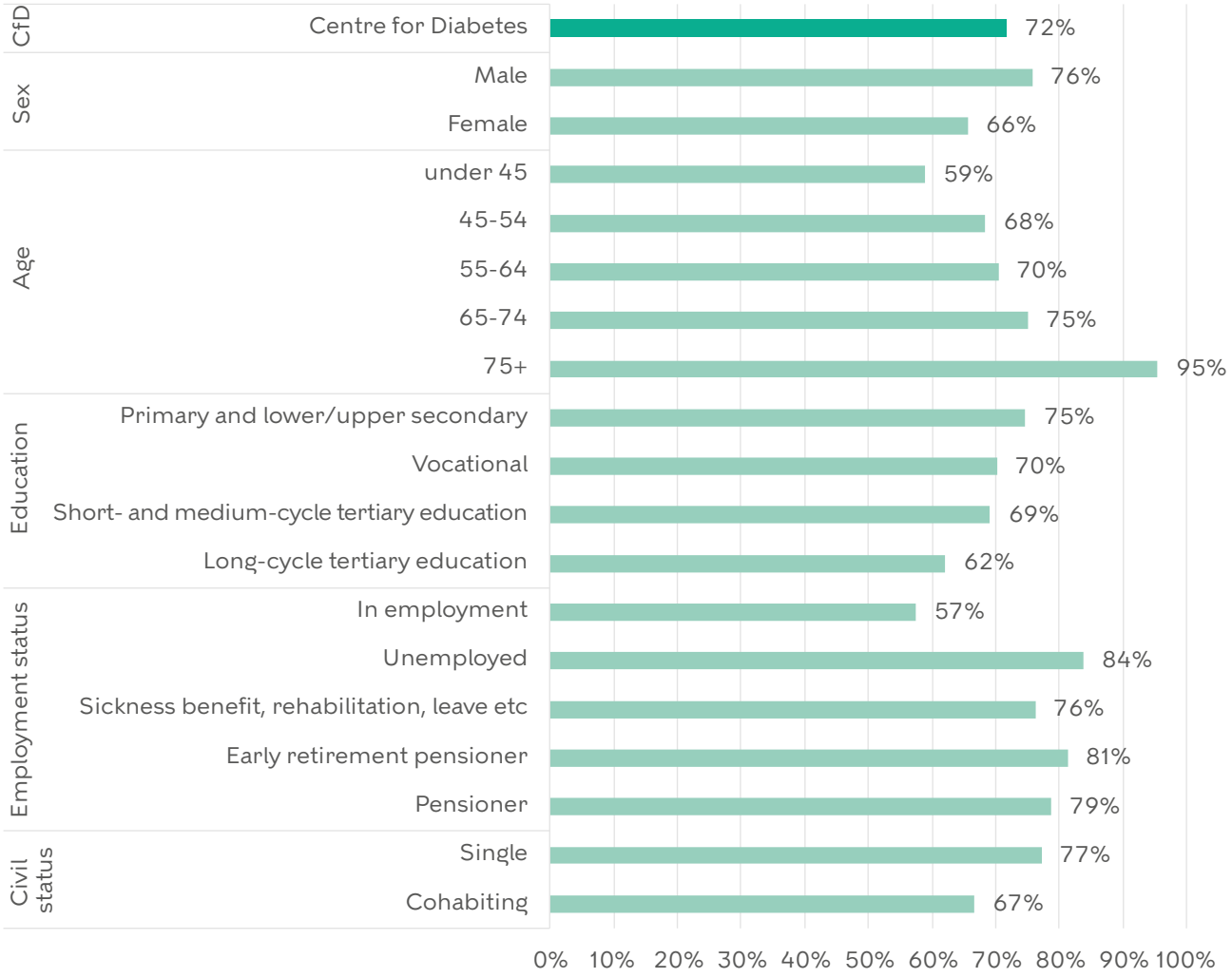
Education: Three out of four citizens with primary and lower secondary/upper secondary as their highest level of completed education do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity, while two out of three citizens with a long-cycle tertiary education do not meet the recommendation. The percentage of citizens who do not meet WHO's minimum recommendation decreases with increasing length of education.

Employment status: Compared with citizens outside the labour market, a higher percentage of citizens affiliated with the labour market do meet WHO's minimum recommendation for moderate-intensity physical activity. In fact, just over half of the citizens affiliated with the labour market do not meet WHO's minimum recommendation, compared with four out of five citizens outside the labour market. The difference is statistically significant.

In the Health Profile 2017, similar assessments show that a significantly higher percentage of citizens affiliated with the labour market meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity[2].

Civil status: Three out of four single citizens do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity. The proportion is somewhat smaller for cohabiting citizens, and the correlation is statistically significant.

Figure 8.3 *Figure 8.3. Citizens who do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity*



WHO's recommendation in combination with other risk factors

This section describes citizens with selected risk factors who meet/do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity per week. Citizens who do not meet the recommendation show more risky health behaviour in respect of a number of factors compared with citizens who meet the recommendation.

Table 8.4 shows that among citizens who do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity, there are statistically significant higher percentages with poorer self-rated health ('fair' or 'poor') and sleep length shorter or longer than recommended, compared with citizens who meet WHO's minimum recommendation.

There are also higher percentages who have a high BMI and who do not meet the Danish Veterinary and Food Administration's dietary recommendations, but these differences are not statistically significant.

Table 8.4 *Incidence of selected risk factors among citizens who meet/do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity*

	Citizens who do not meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity, %	Citizens who meet WHO's minimum recommendation of ≥ 150 minutes of moderate-intensity physical activity, %
'Fair' or 'poor' self-rated health	61.6*	41.2
Obesity (BMI ≥ 30)	69.4	60.0
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	22.8	17.9
Daily smoking	24.1	24.1
Short/long sleep length	25.3*	10.8
Signs of high alcohol consumption	37.9	40.5

** Statistically significant between-groups difference.*

8.3 Physical activity with an increased heart rate

For adults aged 18-65, one of the Danish Health Authority's physical activity recommendations is as follows:

- Citizens should engage in physical activity of vigorous intensity at least twice a week for at least 20 minutes in order to maintain or increase physical condition and muscle strength. This should include activities that increase bone strength and flexibility[7].

For the elderly (65+), this recommendation differs in that it does not specify vigorous intensity. Further recommendations for this age group are stretching exercises, maintain or increasing flexibility and maintain or improving balance.[8]

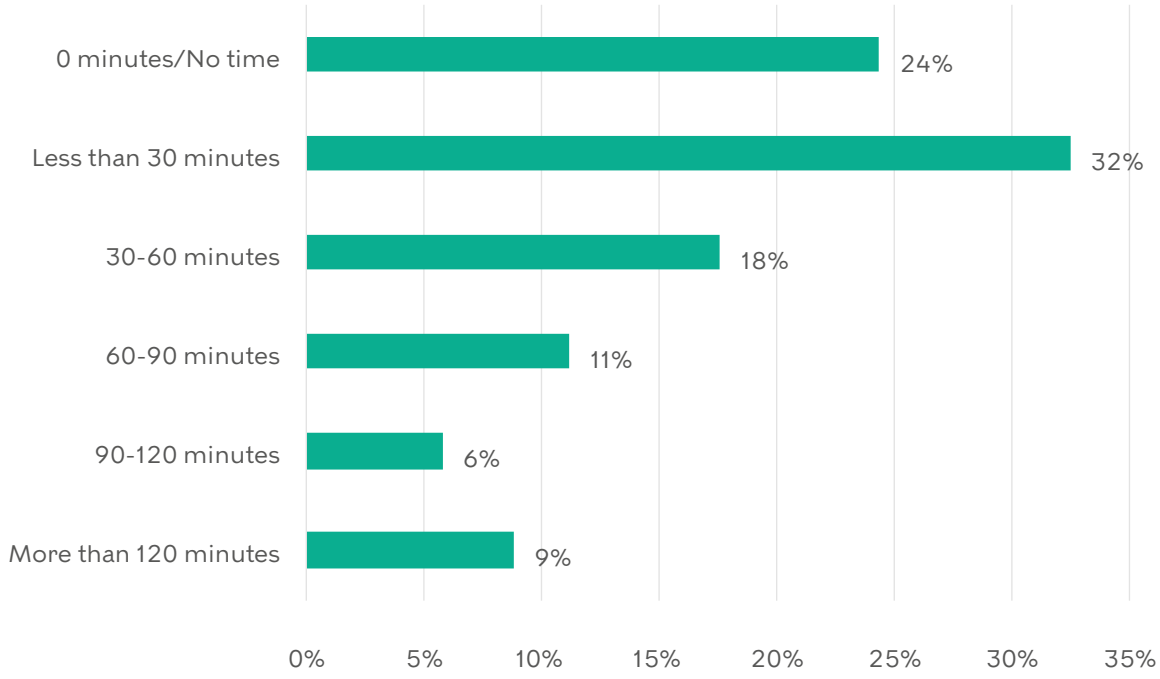
Definitions of intensity

- Light intensity comprises general activities that the citizen most frequently performs every day for a short duration (less than 10 minutes).
- Moderate intensity comprises physical activity where the citizen achieves an increased heart rate and becomes slightly out of breath but can still hold a conversation.
- High intensity comprises physical activity where the citizen gets out of breath and has difficulty holding a conversation[9].

It is well documented that a moderate-to-vigorous intensity level in a given physical activity can have a more positive effect on physical condition, muscle adaptation and other health-promoting physiological processes than a lighter intensity level[5].

Figure 8.5 shows that at the start of the programme slightly more than half of the citizens get out of breath for less than 30 minutes per week and thus do not meet the Danish Health Authority's physical activity recommendation. One in five citizens get out of breath for 30-60 minutes per week and thus potentially meet the recommendation. Around one in six get out of breath for at least 90 minutes per week and thus meet the recommendation.

Figure 8.5 *Physical activity where the citizen gets out of breath (n=296)*

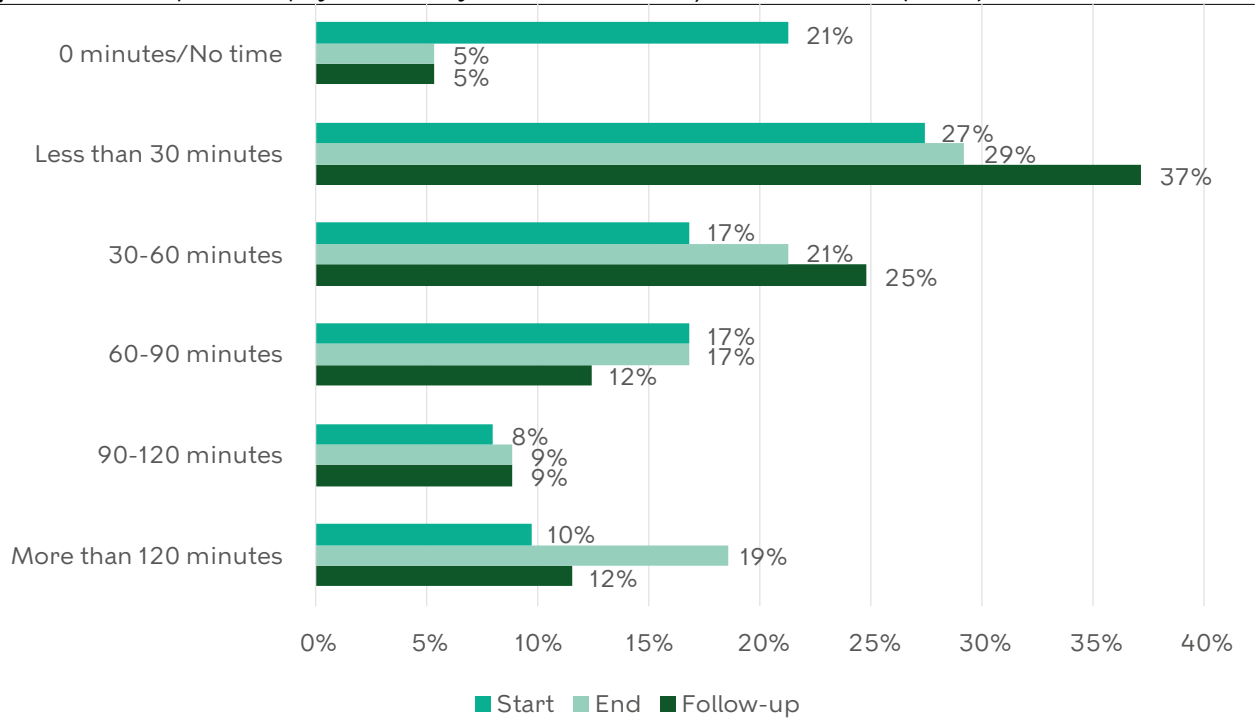


Development

Figure 8.6 shows the development in physical activity where the citizen gets out of breath. The data relate to those citizens who took part in all three evaluations. By the end of the programme, the citizens are significantly more physically active, with a shift towards more minutes of physical activity where they get out of breath. The percentage performing physical activity where they get out of breath for more than two hours per week doubles. The percentage who do not manage to get out of breath at all decreases significantly.

At the six-month follow-up evaluation, the percentage of citizens who are out of breath for 0 minutes is the same as at the end-of-programme evaluation. Conversely, there is an increase in the *less than 30 minutes* and *30–60 minutes* categories compared with the end-of-programme evaluation.

Figure 8.6 *Development in physical activity where the citizen gets out of breath (n=113)*



8.4 Sedentary time

In recent decades, citizens' activity patterns have changed. Generally, active citizens have become more active, while overall the number of sedentary hours has increased, partly due to an increase in sedentary work. Despite the fact that the percentage of Danes exercising in their leisure time appears to have increased, there are large groups in society where sedentary work is not being compensated for by increased physical activity in leisure time[6].

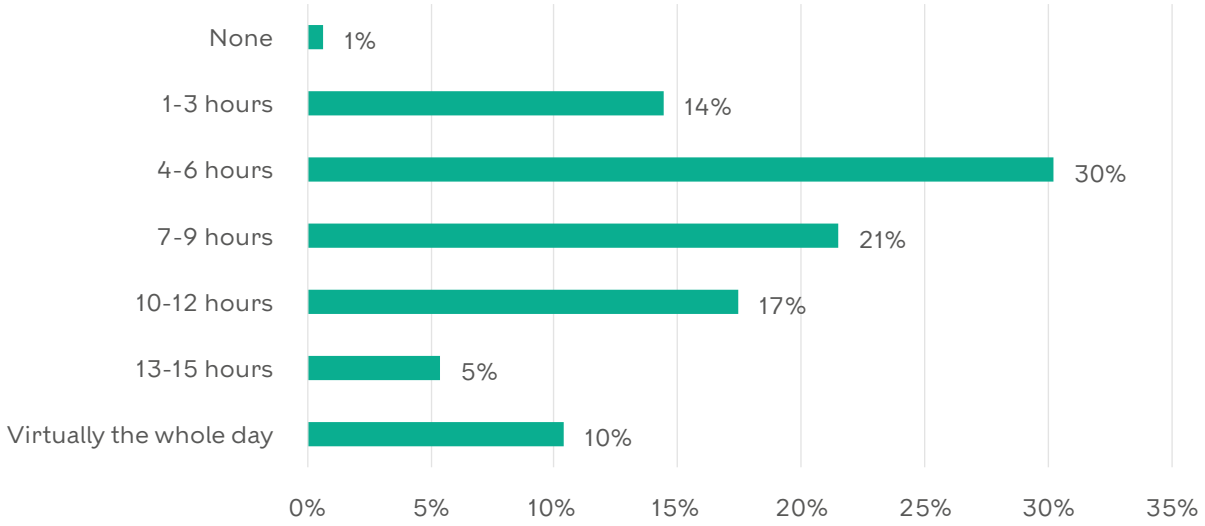
Sedentary behaviour comprises activities that are performed in a sitting or lying position while awake and where the majority of the body's muscles are resting. There is evidence that sedentary behaviour represents an independent risk factor for, among other things, type 2 diabetes and early death in adults[2].

The following questionnaire item provides the basis for this section:

- In a normal day, how much time do you spend sitting down/doing a sedentary activity?

Figure 8.7 shows that at the start of the rehabilitation programme half of the citizens are sedentary for 4-9 hours per day. One in 10 are sedentary for virtually the whole day.

Figure 8.7 *Sedentary activity (n=298)*



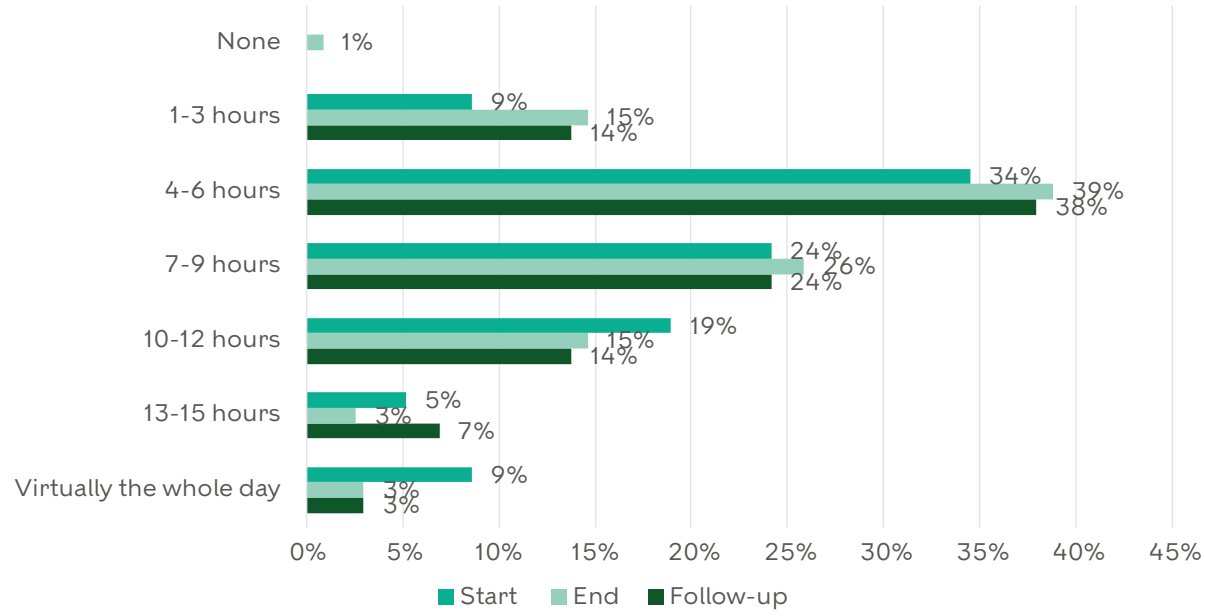
Development

Figure 8.8 shows the development in sedentary activity among those citizens who took part in all three evaluations. By the end of the programme, there is a significant decrease in sedentariness, with a shift towards fewer hours spent on sedentary activities. The percentage of citizens who are sedentary for virtually the whole day more than halves, while the percentage who are sedentary for 4-9 hours per day increases. This trend is still evident at the six-month follow-up evaluation, with only small changes.

A similar distribution is seen in the Health Profile 2017. The percentage of citizens who are sedentary for more than eight hours is 64%, which is marginally higher compared with the Centre for Diabetes.

Figure 8.9 shows the sociodemographic distribution of citizens with high sedentary time. This is classified as being sedentary for more than 10 hours per day.

Figure 8.8 *Development in sedentary activity (n=116)*



Centre for Diabetes: One in three citizens are highly sedentary. There are no comparable data from the Health Profile 2017 [2].

Sex: The percentage of men and women who are highly sedentary is equal.

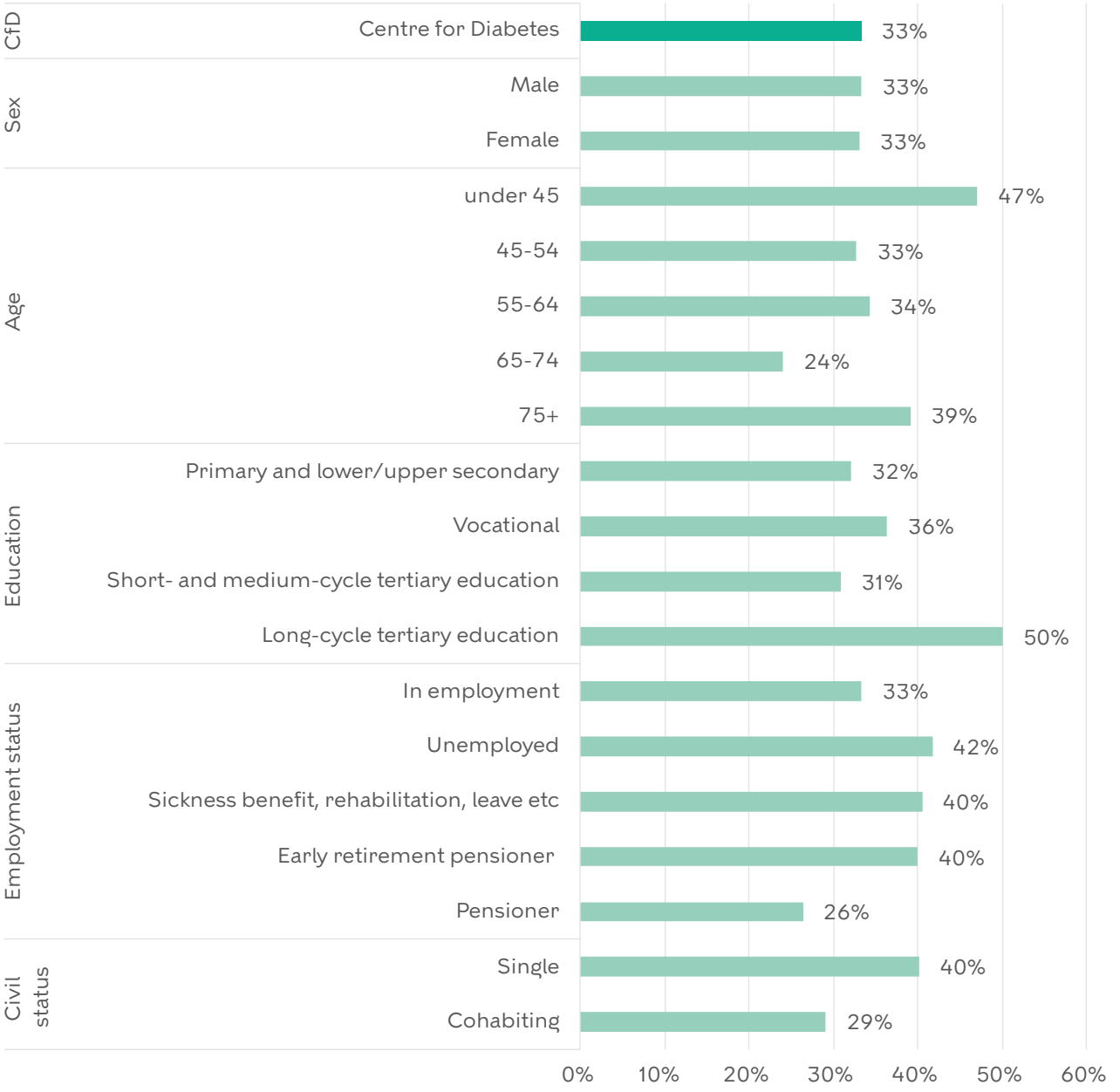
Age: In the under-45 and 75+ age groups, around 40% of the citizens are highly sedentary. In the other age groups, the percentage is somewhat smaller.

Education: Half of the citizens with a long-cycle tertiary education are highly sedentary. Among those citizens with shorter educations, the figure is around one in three.

Employment status: Among citizens affiliated with the labour market, one in three are highly sedentary. Among pensioners, slightly fewer are highly sedentary, while in the other groups slightly more are highly sedentary.

Civil status: A higher percentage of single citizens than cohabiting citizens are highly sedentary.

Figure 8.9 *High sedentary time*

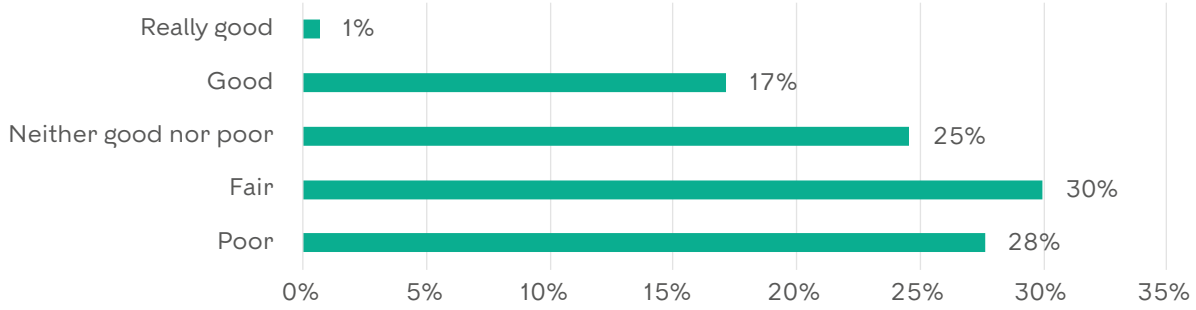


8.5 Self-rated physical condition

Self-rated physical condition is an evaluation tool deployed without the use of physiological measurements. It is a subjective measure that gives an indication of citizens' perception of their own physical condition.

Figure 8.10 shows self-rated physical condition among citizens referred to the Centre for Diabetes. At the start of the programme, around one in four rate their physical condition as 'poor', nearly one in three rate their physical condition as 'fair' and less than one in five rate their physical condition as 'good'.

Figure 8.10 *Self-rated physical condition (n=297)*

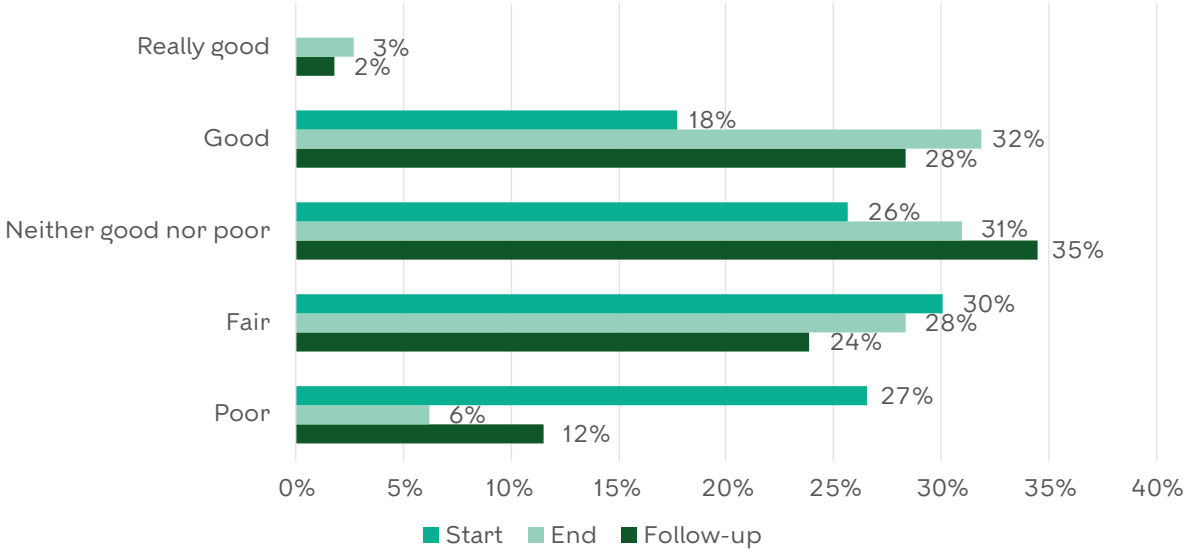


Development

Figure 8.11 shows the development in self-rated physical condition among those citizens who took part in all three evaluations. Generally, it can be seen that self-rated physical condition improves during the course of the programme, and this improvement is still present six months after the end of the programme, though there has been a small shift back towards poorer self-rated physical condition. Thus, by the end of the rehabilitation programme there has been almost a doubling in the percentage of citizens rating their physical condition as 'good' or 'really good'. The percentage remains virtually unchanged at the six-month follow-up evaluation. At the same time, there is a corresponding significant decrease in the incidence of 'poor' self-rated physical condition, from around one in four at the start of the rehabilitation programme to around one in 20 by the end. Six months later, the proportion is one in eight, which still represents a significant reduction overall.

These figures are in line with those of the Health Profile 2017, albeit the percentage of citizens self-rating their physical condition as 'fair' or 'poor' is 10 percentage points higher among citizens at the Centre for Diabetes.

Figure 8.11 *Development in self-rated physical condition (n=113)*



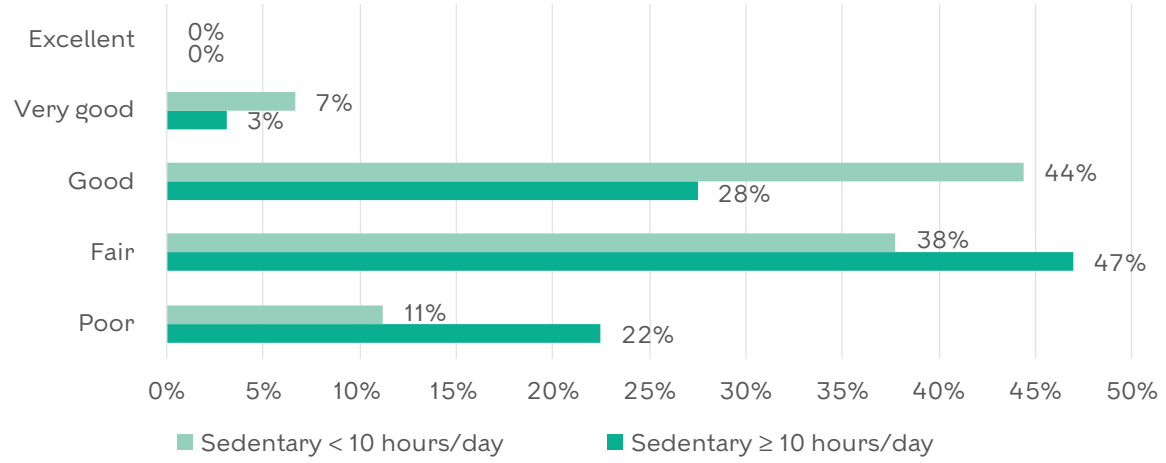
8.6 Self-rated health and sedentary activity

Self-rated health concerns the citizen's perception and experience of their own health. Self-rated health is an independent risk factor for morbidity and mortality. The poorer the citizen rates their health, the higher their risk of developing disease and dying[2].

Figure 8.12 shows self-rated health among citizens engaging in sedentary activity for less than and more than 10 hours per day.

Figure 8.12 shows that highly sedentary citizens have poorer self-rated health compared with those who are less sedentary. Among citizens who are sedentary for ≥ 10 hours/day, around two out of three self-rate their health as 'fair' or 'poor', compared with a figure of just one in two among citizens who are sedentary for < 10 hours/day. Only one in four citizens who are sedentary for ≥ 10 hours/day rate their health as 'good', compared with a figure of one in two among citizens who are sedentary for < 10 hours/day.

Figure 8.12 *Self-rated health and sedentary activity at the baseline measurement (n=294)*



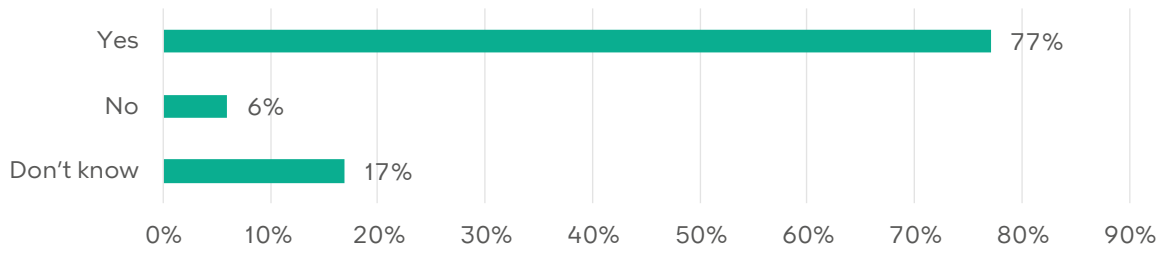
8.7 Desire for increased physical activity

In recent years, there has been increased focus on publicising the recommendations on increased physical activity and the positive effects on health and well-being. It can therefore be assumed that more people are aware of the benefits of physical activity in everyday life[10].

Figure 8.13 shows that at the start of the rehabilitation programme three out of four citizens want to be more physically active. A small proportion of citizens do not want to be more physically active in their everyday life, while around 20% answer 'don't know'.

In the City of Copenhagen assessment of citizens with type 2 diabetes, two out of three want to be more physically active[11], which means that the citizens at the Centre for Diabetes are more motivated to change their physical activity habits than the general diabetes population.

Figure 8.13 *Desire for increased physical activity at the baseline measurement (n=301)*



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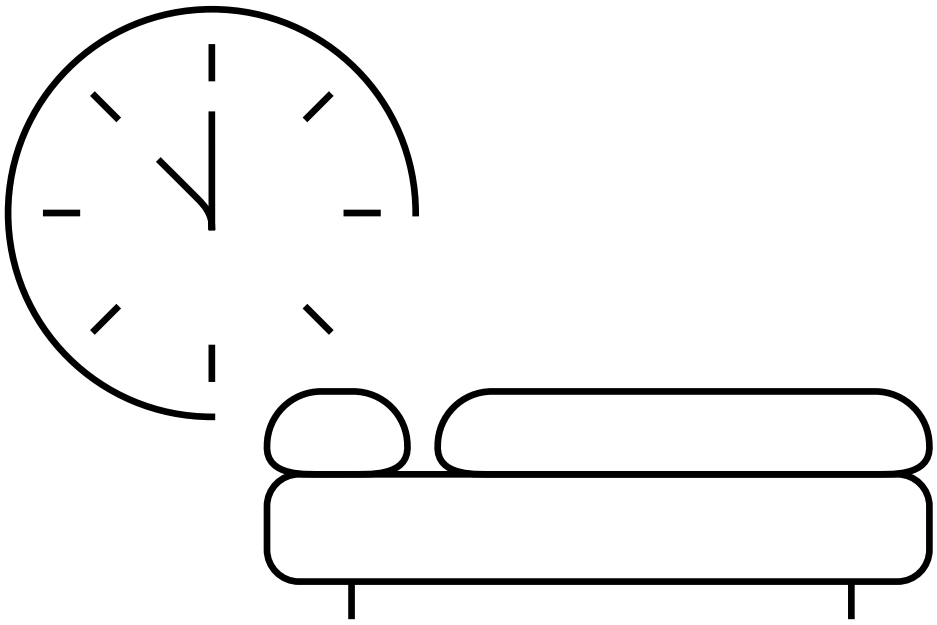


9

SLEEP

9 Sleep

- One in five citizens 'never' or 'almost never' get enough sleep to feel rested.
- Of those citizens who 'never' or 'almost never' get enough sleep to feel rested, 85% have 'poor' self-rated health.
- One in five citizens sleep either too much (> 9 hours per 24-hour period) or too little (< 6 hours per 24-hour period).
- The citizens' sleep pattern does not change from the start of the rehabilitation

Introduction

Sleep is essential for good physical and mental health, and it extremely important for the functioning and restoration of the body and brain. Sleep also has an influence on hormonal regulation, the functioning of the immune system and the body's metabolism. Sleep is therefore a health-related behaviour that impacts general health to the same extent as eating habits and physical activity[1].

When people prefer to sleep and how much sleep they need vary considerably across the life span. After reaching adulthood, the need for sleep is reduced, and as they get older many people prefer to go to bed and get up earlier[2].

Both the length and quality of sleep can be affected by many external factors. Smoking, caffeine and alcohol have been shown to have a negative influence on both the length and quality of sleep. The same applies for exposure to electronic lights, especially blue light, and stress. Shift work involving periodic night work and fluctuating circadian rhythms is also negatively related to human sleep and health. Conversely, exposure to daylight, daily physical activity and a cool bedroom have been shown to potentially improve both the length and quality of sleep[1].

Chapter 9 describes citizens' perception of whether they get enough sleep to feel rested. It also covers sleep problems in combination with selected risk factors and sleep length in combination with selected risk factors.

9.1 Sleeping enough to feel rested

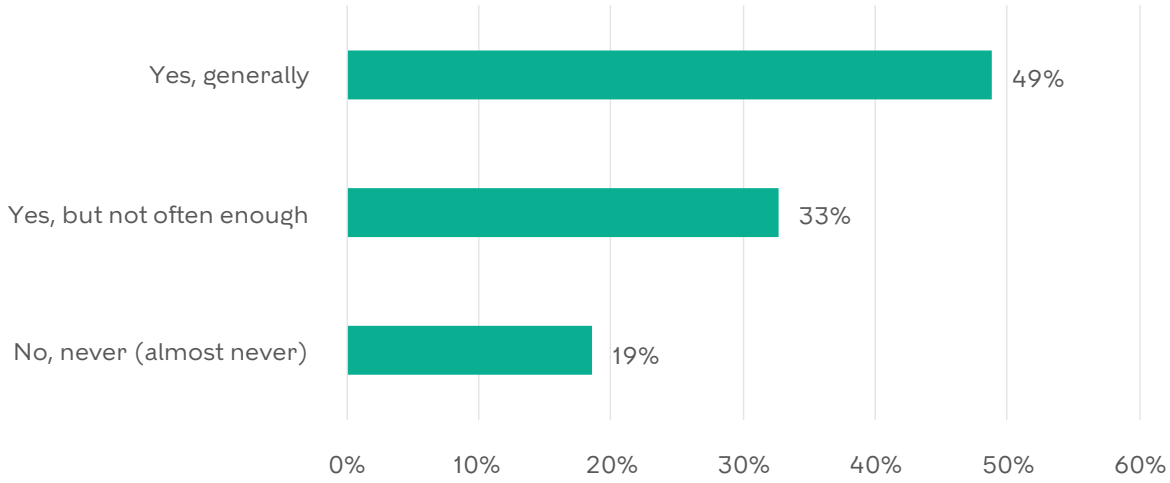
Persistent sleep problems or lack of sleep can have negative consequences for health. Feeling rested can be an indicator of whether a person gets the sleep that they physiologically need.

The following questionnaire item provides the basis for this section:

- Do you think you get enough sleep to feel rested?

Figure 9.1 shows that at the start of the programme half of the citizens generally sleep enough to feel rested. Around one in three do not sleep enough to feel rested often enough, while one in five 'never' or 'almost never' get enough sleep to feel rested. These figures are in line with those of the Health Profile 2017, although there is a slightly higher percentage of citizens who 'never' or 'almost never' feel rested among Copenhagen residents with type 2 diabetes compared with the general population of Copenhagen[3].

Figure 9.1 *Sleeping enough to feel rested (n=291)*



Development

Figure 9.2 shows the development in whether citizens feel rested after sleep among those who took part in all three evaluations. By the end of the programme, the percentage of citizens who generally feel rested is slightly higher than at the start of the programme. At the six-month follow-up evaluation, this percentage has increased further.

Figure 9.2 *Development in sleeping enough to feel rested (n=114)*

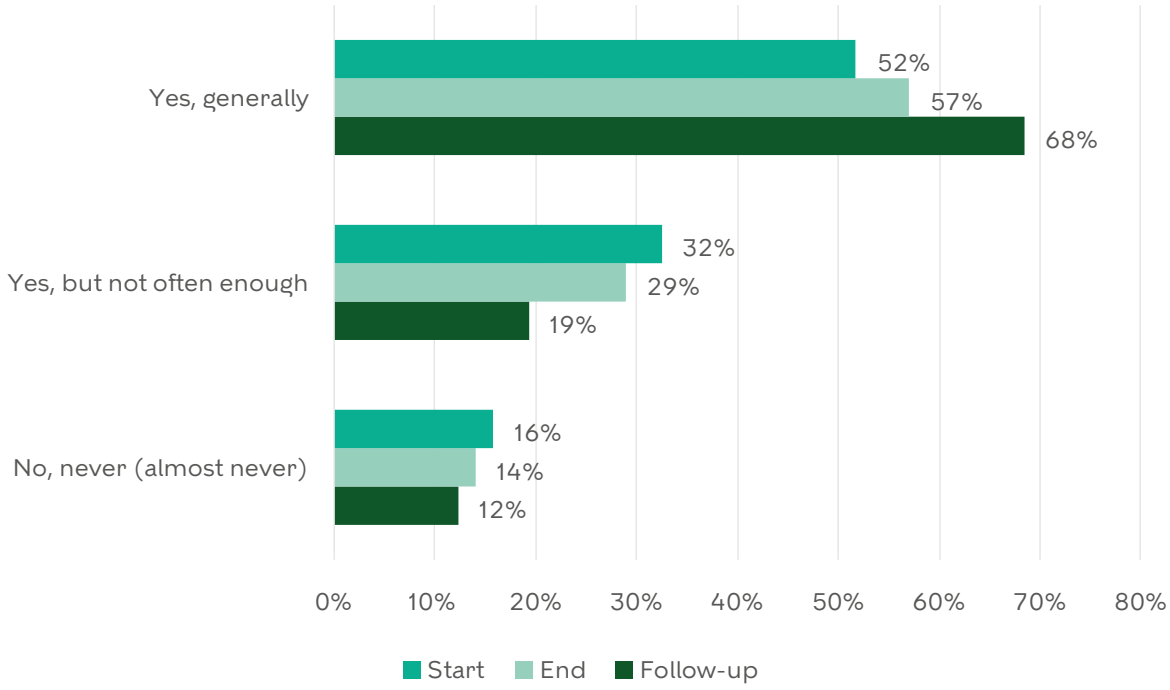


Figure 9.3 shows the sociodemographic distribution of citizens indicating that they 'never' or 'almost never' get enough sleep to feel rested.

Centre for Diabetes: One in five citizens 'never' or 'almost never' get enough sleep to feel rested.

Sex: A slightly higher percentage of women than men 'never' or 'almost never' get enough sleep to feel rested.

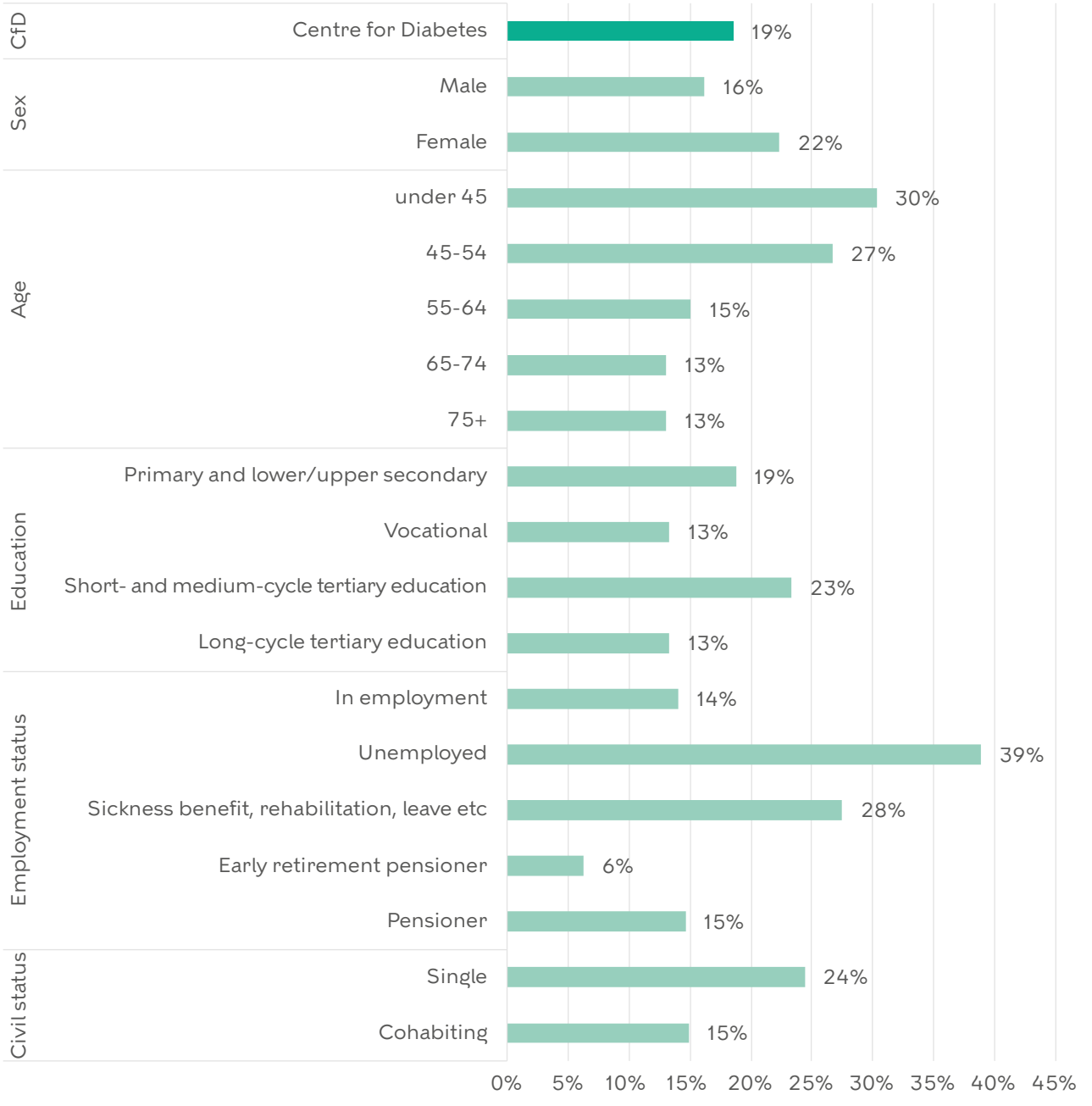
Age: The proportion of citizens who 'never' or 'almost never' get enough sleep to feel rested decreases with increasing age, from one in three in the under-45 age group to around one in 10 in the 75+ age group, which represents a statistically significant difference.

Education: The percentage of citizens who 'never' or 'almost never' get enough sleep to feel rested is higher among those with a primary and lower secondary/upper secondary education and a short- or medium-cycle tertiary education compared with the other education groups.

Employment status: The percentage of citizens who 'never' or 'almost never' get enough sleep to feel rested is more than double among those outside the labour market compared with those in employment. The difference is statistically significant.

Civil status: The percentage of citizens who 'never' or 'almost never' get enough sleep to feel rested is significantly higher among single citizens than among cohabiting citizens.

Figure 9.3 *'Never' or 'almost never' get enough sleep to feel rested*



9.2 Sleep problems in combination with other risk factors

This section describes selected risk factors among citizens who 'never' or 'almost never' feel rested and citizens who 'generally' or 'not often enough' feel rested.

Table 9.4 shows that 85% of citizens who 'never'/'almost never' feel rested have 'fair' or 'poor' self-rated health, compared with just under 50% who 'generally'/'not often enough' feel rested. The difference is statistically significant. Slightly more than one in four citizens who 'never'/'almost never' feel rested show signs of high alcohol consumption, compared with four out of 10 who 'generally'/'not often enough' feel rested. The difference is statistically significant.

Among citizens who smoke daily, there is a higher percentage who 'never'/'almost never' feel rested compared with those who 'generally'/'not often enough' feel rested. Just under one in three citizens who 'never'/'almost never' feel rested do not meet the Danish Veterinary and Food Administration's dietary recommendations, while the same applies for one in five of those who 'generally'/'not often enough' feel rested. These differences are not statistically significant. In respect of citizens not meeting WHO's recommendations for physical activity and citizens with obesity, there are no between-group differences.

Table 9.4 *Incidence of selected risk factors among citizens who 'never'/'almost never' feel rested and citizens who 'generally'/'not often enough' feel rested*

	'Never'/ 'almost never', %	'Generally'/ 'not often enough', %
'Fair' or 'poor' self-rated health	85.2*	48.9
Obesity (BMI ≥ 30)	67.9	66.1
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	29.4	19.6
Daily smoking	30.2	21.1
Not meeting WHO's recommendations for physical activity	73.3	70.9
Signs of high alcohol consumption	26.4*	42.1

**Statistically significant between-groups difference.*

9.3 Sleep length

Adults generally need 6–9 hours of sleep per 24-hour period. Short sleep length is defined as < 6 hours and long sleep length as > 9 hours per 24-hour period.

Short sleep length has been related to deteriorations in brain function, such as weakened concentration and memory[1]. Short sleep length has also been shown to influence hunger and satiation regulation. Both short and long sleep length have repeatedly been associated with increased risk of developing obesity, cardiovascular disease and type 2 diabetes. Both short and long sleep length have been related to increased mortality[4,5].

The following questionnaire item provides the basis for this section:

- Roughly how many hours and minutes do you sleep in an ordinary 24-hour period during the week?

Figure 9.5 shows the sociodemographic distribution of citizens with long sleep length (> 9 hours per 24-hour period) and short sleep length (< 6 hours per 24-hour period).

Centre for Diabetes: At the start of the programme, 14% of citizens sleep < 6 hours per 24-hour period and just under one in 10 sleep > 9 hours per 24-hour period. Hence, four out of five citizens sleep 6-9 hours per 24-hour period. Compared with the Health Profile 2017, there are three times as many citizens with short sleep length at the Centre for Diabetes and nearly twice as many with long sleep length[3].

Sex: There is no difference in the percentages of men and women in respect of both short and long sleep length.

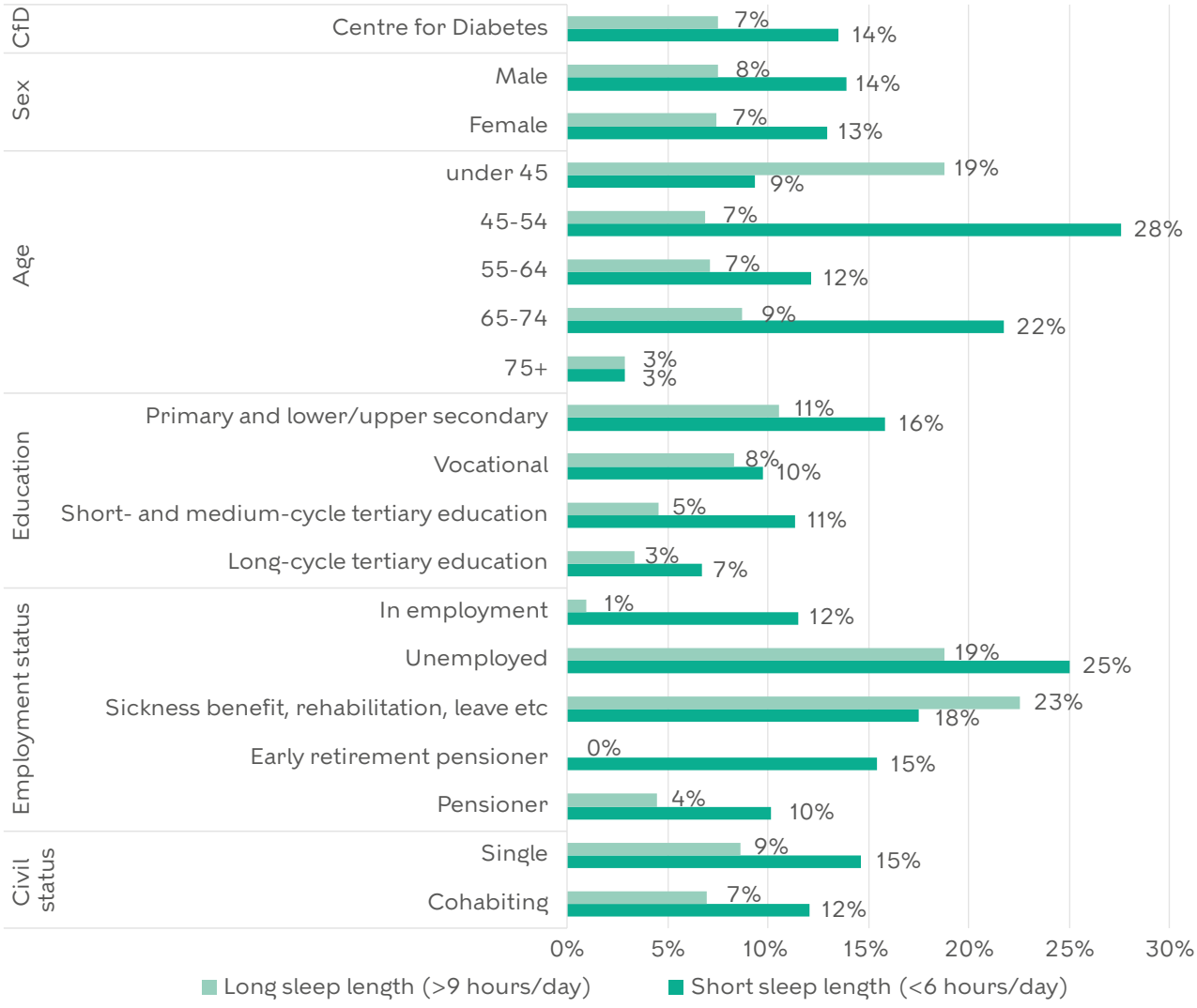
Age: In the under-45 age group, one in five citizens have long sleep length. In the other age groups, the figure is just under one in 10. The percentage of citizens with short sleep length is highest among 45-54-year-olds and 65-74-year-olds, with around one in four having short sleep length.

Education: The percentage of citizens who sleep > 9 hours decreases with increasing length of education, from 11% among citizens with a primary and lower secondary/upper secondary education to 3% among citizens with a long education. There is a similar trend among citizens with short sleep length.

Employment status: The percentage of citizens with short or long sleep length is highest among those who are unemployed or in receipt of sickness benefit, undergoing vocational rehabilitation, on leave and so on.

Civil status: There are very small percentage differences between single and cohabiting citizens in respect of both short and long sleep length. For both groups, the distribution of short and long sleep length is around one in 10.

Figure 9.5 *Sleep length*



9.4 Short and long sleep length in combination with other risk factors

This section shows the distribution of selected risk factors among citizens with short/long sleep length and normal sleep length.

Table 9.6 shows that significantly more citizens with short/long sleep length have 'fair' or 'poor' self-rated health, do not meet the Danish Veterinary and Food Administration's dietary recommendations, are daily smokers, do not meet WHO's recommendations for physical activity and 'never' or 'almost never' feel rested after sleep, compared with citizens with normal sleep length. There are no between-group differences in respect of obesity (BMI ≥ 30) and signs of high alcohol consumption.

Table 9.6 *Incidence of selected risk factors among citizens with short/long sleep length and normal sleep length*

	Short/long sleep length, %	**Normal** sleep length (6-9 hours), %
'Fair' or 'poor' self-rated health	76.3*	47.0
Obesity (BMI ≥ 30)	65.5	65.3
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	30.5*	18.0
Daily smoking	35.1*	21.0
Not meeting WHO's recommendations for physical activity	84.5*	66.2
'Never'/'almost never' rested	39.7*	10.9
Signs of high alcohol consumption	33.9	40.4

**Statistically significant between-groups difference.*

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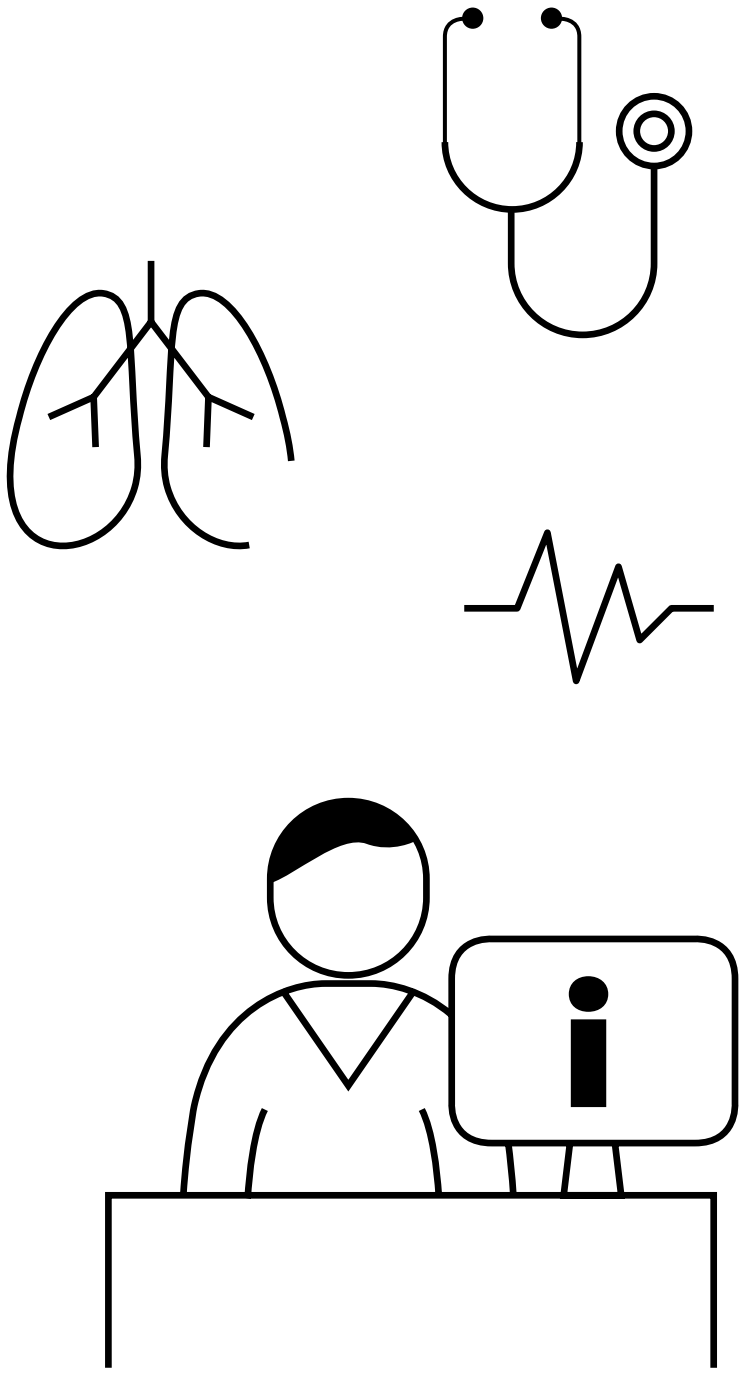


10
PHYSIOLOGICAL MEASUREMENTS

10 Physiological measurements

- HbA_{1c} falls by 6.5 mmol/mol from the baseline measurement to the final measurement. This is maintained six months after the end of the programme.
- Citizens who have only had type 2 diabetes for a year have a greater decrease in HbA_{1c} compared with those who have had diabetes for longer.
- A large percentage of citizens have obesity at the start of the programme, with 66% having a BMI ≥ 30. There is a small reduction in the average BMI over the course of the programme.
- There is social inequality in the distribution of BMI ≥ 30.
- At the end of the programme, systolic blood pressure has fallen by 10.7 mm Hg, and six months later it has fallen further still.
- At the start of the programme, 76% of citizens have systolic blood pressure > 130 mm Hg. By the end of the programme, this has fallen by approximately 80 percentage points.
- Just under one in two citizens have total cholesterol > 4.5 mmol/l and one in five have LDL cholesterol > 2.6 mmol/l. At the end of the programme, no changes are evident in either total or LDL cholesterol.

Introduction

This chapter describes physiological measurements that provide a picture of whether citizens are achieving the therapeutic goals described in the national guidelines[1]. These results indicate whether citizens are at risk of developing micro- and macrovascular complications, and consequently type 2 diabetes.

The measurements were selected in order to be able to demonstrate the impact of the programme. The goal of a rehabilitation programme is for citizens to cope with life with diabetes. It might be that after taking part in various interventions they change their health behaviour, or that they become better at taking their medication. Measurements were taken for the following recognised indicators:

- **HbA_{1c}**
- **BMI**
- **Fat percentage**
- **Waist circumference**
- **Blood pressure**
- **Lipids**

In order to ensure that all measurements were taken consistently and are comparable, a set of standard operating procedures (SOPs) was drawn up (Appendix 8) according to international guidelines for measurements (the European Health Examination Survey, EHES). The measurements were performed by nurses at the Centre for Diabetes who had received detailed theoretical and practical instruction and had experience of these types of measurement.

Chapter 10 describes the development in physiological measurements from the start of the rehabilitation programme up to the six-month follow-up evaluation, with a view to showing changes in values.

10.1 HbA_{1c}

HbA_{1c}, also referred to as long-term blood sugar, is used both as a diagnostic test and for monitoring high glucose values in citizens with type 2 diabetes. HbA_{1c} reflects the citizen's average plasma glucose over the last 8-12 weeks [2].

For every 5 mmol/mol increase in HbA_{1c}, the risk of death increases by approximately 25%. This also applies for values in the normal range, and the risk is independent of other cardiovascular risk factors. The GP sets the individual goal together with the patient. The goal takes into account the duration of the condition, comorbidity, status of complications and tendency for blood sugar to fall too low (hypoglycaemia) [1].

HbA_{1c} is stated in mmol/mol, and values above 48 mmol/mol are diagnostic for diabetes. An HbA_{1c} value of below 48 mmol/mol is generally aimed for in the first years after diagnosis, or of 53-58 mmol/mol in citizens with cardiovascular complications[1].

Table 10.1 shows the average for HbA_{1c} measured at the start, end and follow-up of a rehabilitation programme for citizens at the Centre for Diabetes. At the start of the programme, the average for HbA_{1c} is 57.0 mmol/mol (slightly higher among those who took part in all three evaluations (58.5)). By the end of the programme, there has been a statistically significant decrease of 6.5 mmol/mol. By the six-month follow-up, there has been a small increase of 0.7 mmol/mol, though this is not significantly different from the end measurement.

Table 10.1 also shows that HbA_{1c} is slightly higher for citizens who have had the condition for more than one year, compared with those who have had the condition for < 1 year only (58.5 mmol/mol vs 55.2 mmol/mol). Irrespective of diabetes duration, HbA_{1c} decreases in both groups, though by more in the group who have had the condition for < 1 year only.

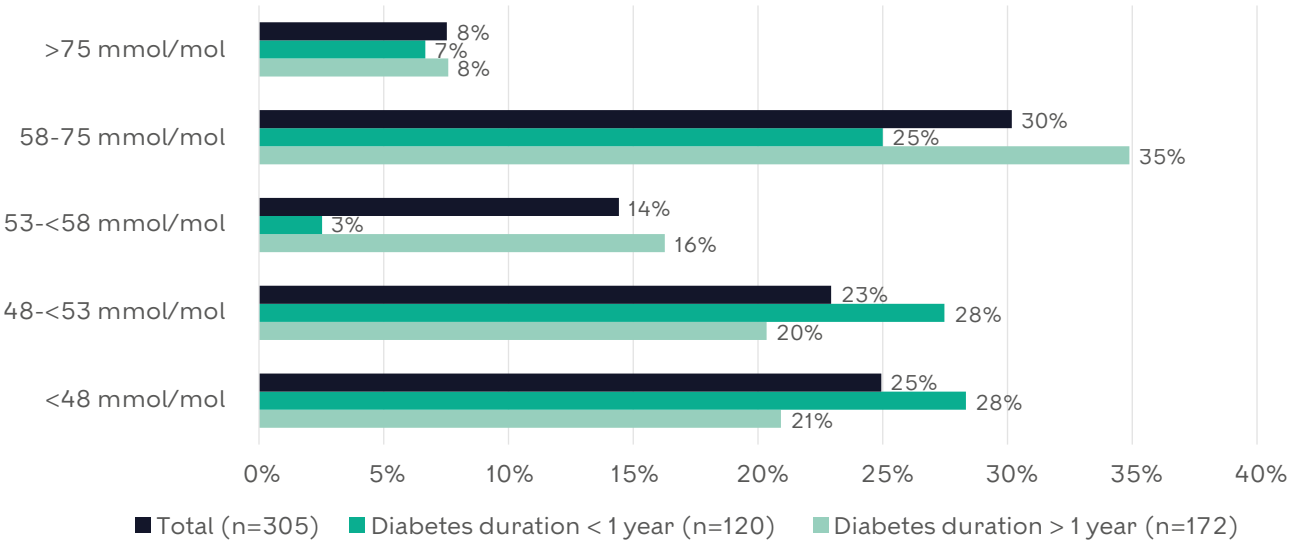
Table 10.1 *Average HbA_{1c}*

	Start	Start	End	Foll.	Δstart-end	Δstart-follow.	Δend-follow.
n	305	131	131	131	131	131	131
HbA_{1c}, mmol/mol, avg (95% CI)	57.0 (55.4;58.6)	58.5 (55.8;61.2)	52.0 (49.8;54.2)	52.7 (50.7;54.8)	-6.5* (-9.0;-4.1)	-5.8* (-8.8;-2.8)	0.7 (-1.0;2.5)
HbA_{1c}, diabetes duration < 1 year	55.2 (52.8;57.7)	56.4 (52.4;60.3)	47.6 (45.4;49.7)	49.4 (47.0;51.9)	-8.8* (-12.6;-5.0)	-6.9* (-11.5;-2.4)	1.9* (-0.5;4.3)
HbA_{1c}, diabetes duration > 1 year	58.5 (56.3;60.6)	60.1 (56.2;63.9)	55.1 (51.7;58.6)	54.9 (52.2;57.5)	-4.9* (-8.0;-1.9)	-5.2* (-9.3;-1.2)	-0.3 (-3.0;2.4)

** Statistically significant.*

Figure 10.2 shows the distribution of HbA_{1c} among citizens referred to the Centre for Diabetes. It can be seen that citizens in all HbA_{1c} categories are being referred, though two out of three have HbA_{1c} < 58 mmol/mol. One in four have HbA_{1c} < 48 mmol/mol. Two out of five have HbA_{1c} > 58 mmol/mol, and slightly fewer than one in 10 have HbA_{1c} > 75 mmol/mol. It can also be seen that the longer the diabetes duration, the higher the HbA_{1c}, though it should be noted that one in three citizens who have had diabetes for < 1 year only have HbA_{1c} > 58 mmol/mol.

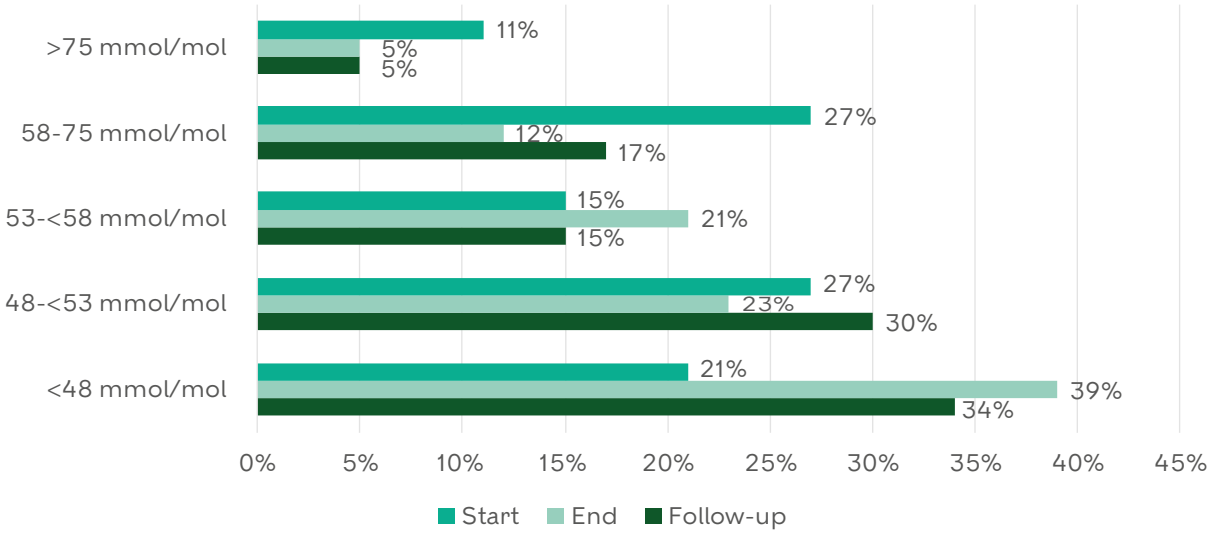
Figure 10.2 *Distribution of HbA_{1c} among all citizens (n=305)*



Development

Figure 10.3 shows the development in HbA_{1c} among those citizens who took part in all three evaluations. By the end of the programme, there has been a doubling in the percentage of citizens with HbA_{1c} < 48 mmol/mol, to 39%. Correspondingly, there is a decrease in the percentage of citizens with HbA_{1c} > 58 mmol/mol. By the six-month follow-up evaluation, there has been a small decrease in the percentage of citizens with HbA_{1c} < 48 mmol/mol, compared with the end-of-programme evaluation.

Figure 10.3 *Development in HbA_{1c} among citizens who took part in all three evaluations (n=131)*



10.2 Weight

Overweight leads to insulin resistance and is thus an important risk factor for developing type 2 diabetes. Both insulin resistance and glycaemic control (HbA_{1c}) are improved through weight loss[3].

Body mass index (BMI) is a practical measurement for assessing weight in adults. The World Health Organization (WHO) has defined limit values for BMI in adults in relation to the health risk associated with various weight categories[4]:

- Underweight: BMI below 18.5
- Normal weight: BMI 18.5–24.9
- Pre-obesity: BMI 25.0–29.9
- Obesity: BMI above 29.9

In all age groups, BMI should be interpreted with caution, partly because it does not include the distribution of fat and muscle tissue. In the elderly and muscular people, in particular, the fat distribution is different to that in younger or less fit people[5].

Table 10.4 shows that among all citizens referred to the Centre for Diabetes the average BMI is 32.2. Among those who took part in all three evaluations the average is slightly lower at the start of the programme. From the start of the programme to the end, the average BMI decreases by one unit, which is statistically significant. By the six-month follow-up evaluation, it increases slightly, and the difference from the start remains significant.

Table 10.4 also shows weight and weight changes. At the start of the programme, the citizens' average weight is 95.5 kg. It is slightly higher among men than among women (data not shown). From the start of the programme to the end, the average weight decreases by 2.4 kg, and this is maintained through to the six-month follow-up evaluation. Although the decrease is statistically significant, this only equates to a weight loss of 2.5%.

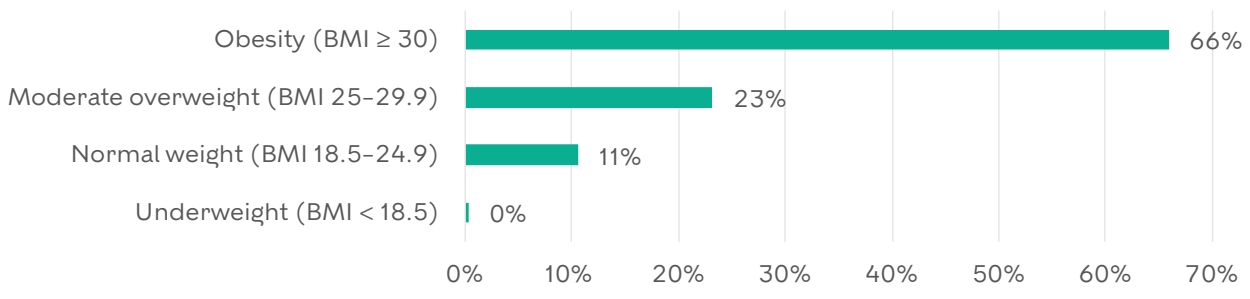
Table 10.4 *BMI and weight*

	Start	Start	End	Foll.	Δstart-end	Δstart-foll.	Δend-foll.
n; BMI	302	126	126	126	126	126	126
BMI, avg (95% CI)	32.2 (31.5;32.9)	31.8 (30.8;32.8)	30.8 (29.8;31.8)	31.0 (30.0;31.9)	-1.0* (-1.5;-0.5)	-0.8* (-1.3;-0.4)	0.2 (-0.3;0.7)
n; Weight	302	130	130	130	130	130	130
Weight (kg). avg (95% CI)	95.5 (92.9;98.0)	96.9 (92.9;100.9)	94.5 (90.6;98.5)	94.6 (90.8;98.5)	-2.4* (-3.1;-1.8)	-2.3* (-3.1;-1.5)	0.1 (-0.5;0.7)

** Statistically significant.*

Figure 10.5 shows the distribution of BMI at the start of the programme among all citizens referred to the Centre for Diabetes. One in 10 have normal weight. Around 90% have moderate overweight or obesity. Specifically, two out of three have obesity and around one in four have moderate overweight. By comparison, among citizens with diabetes in the Capital Region of Denmark and the City of Copenhagen around one in three have obesity[6,7].

Figure 10.5 *Distribution of BMI (n=302)*



Development

Figure 10.6 shows the development in BMI among those citizens who took part in all three evaluations. By the end of the rehabilitation programme, the percentage of citizens with obesity (BMI ≥ 30) has decreased significantly, by 13 percentage points. At the same time, the percentage of citizens who have moderate overweight has increased. In the other categories, there are no significant changes. By the six-month follow-up evaluation, the percentage of citizens with obesity increases again.

Figure 10.6 *Development in BMI (n=126)*

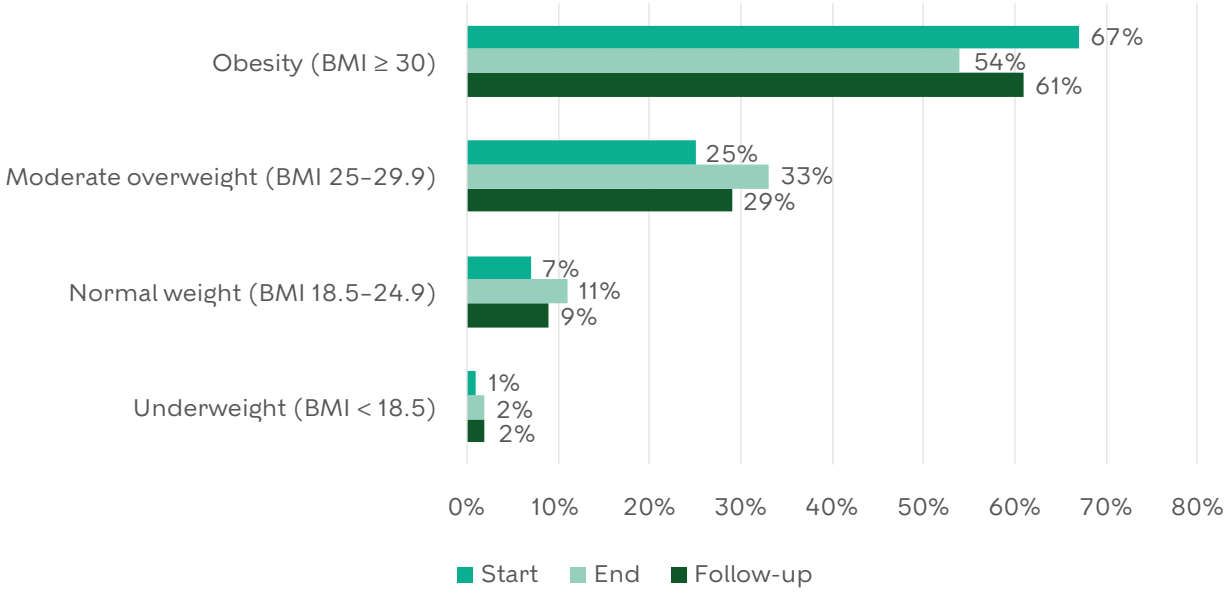


Figure 10.7 describes the sociodemographic distribution of citizens with obesity (BMI ≥ 30) at the start of the rehabilitation programme.

Centre for Diabetes: Two-thirds of all citizens have obesity.

Sex: The percentage of women with obesity is higher than the percentage of men with obesity. Specifically, 71% of women have obesity compared with 62% of men.

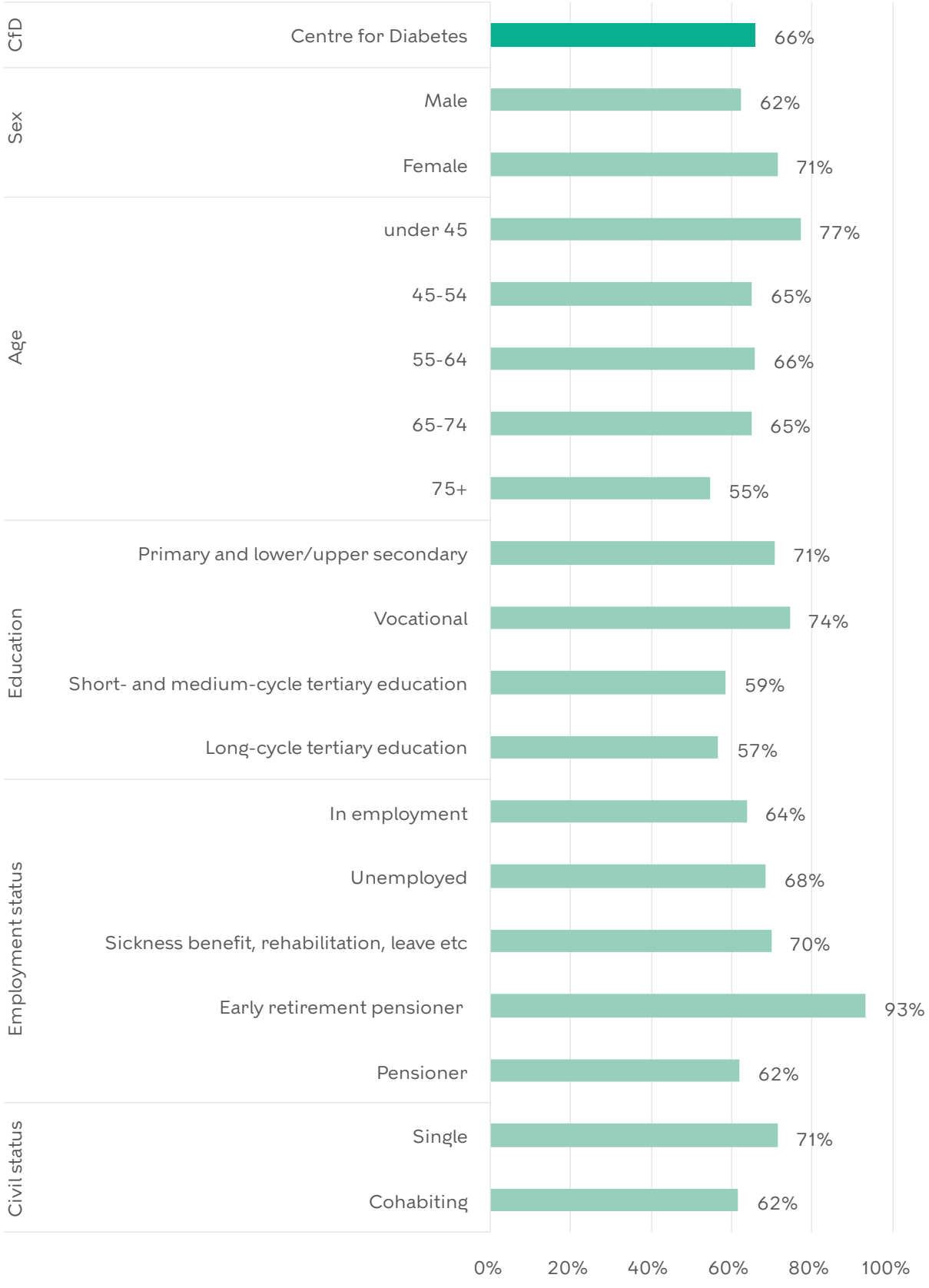
Age: The percentage of citizens with obesity is highest in the youngest age group, where just over three out of four have obesity. The percentage is lowest in the oldest age group, where just over half have obesity. In the intermediate age groups, two out of three citizens have obesity.

Education: The incidence of obesity decreases with increasing level of education. Specifically, 71% of citizens with a primary and lower secondary/upper secondary education have obesity, whereas the figure is only 57% among citizens with a long-cycle tertiary education.

Employment status: The incidence of obesity is higher among citizens outside the labour market and lower among citizens in employment and pensioners. Nearly all the early retirement pensioners have obesity.

Civil status: The incidence of obesity is slightly higher among citizens who are single compared with citizens who are cohabiting.

Figure 10.7 *Citizens with obesity (BMI ≥ 30)*



10.3 Obesity combined with other risk factors

This section describes selected risk factors among those citizens with BMI ≥ 30 and those with BMI < 30.

Table 10.8 shows that there are no significant differences in the distribution of risk between citizens with BMI ≥ 30 and citizens with BMI < 30. It should be noted, however, that the percentage of citizens not meeting WHO's recommendations for physical activity is notably higher among citizens with BMI ≥ 30 than among those with BMI < 30.

Table 10.8 *Incidence of selected risk factors among citizens with BMI ≥ 30 (obesity) and BMI < 30.*

	BMI ≥ 30 (%)	BMI < 30 (%)
'Fair' or 'poor' self-rated health	58.5	51.0
Not meeting the Danish Veterinary and Food Administration's dietary recommendations	22.9	19.2
Daily smoking	23.7	24.0
Not meeting WHO's recommendations for physical activity	74.0	65.3
Short/long sleep length	21.0	20.8
Signs of high alcohol consumption	39.2	39.3

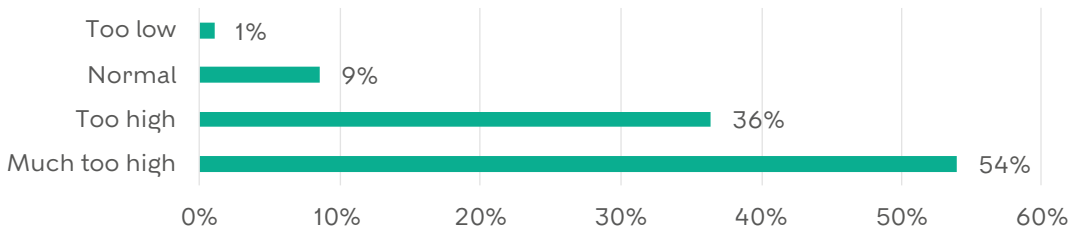
No significant differences.

10.4 Body fat percentage

As mentioned above, BMI needs to be interpreted with caution, hence body fat percentage is used as a supplementary measure. The body fat percentage measurement indicates what proportion of the body comprises fat. The distribution of citizens' body fat percentage can be categorised into 'too low', 'normal', 'too high' and 'far too high' *(see Appendix 9 for categorisation)*.

Figure 10.9 shows that only around one in 10 citizens have a 'normal' body fat percentage, whereas just over one in three have a body fat percentage that is 'too high', and just over one in two have a body fat percentage that is 'much too high'. There are no significant differences in the distribution between men and women or across age groups, nor between the three evaluations (data not shown).

Figure 10.9 *Body fat percentage (n=291). Account has been taken of sex and age in accordance with Gallagher et al. 2000*[8]



10.5 Waist measurement

Waist measurement is recommended as a supplement to BMI in adults because it gives a better picture of the fat distribution in the body.

A high waist measurement increases the risk of developing lifestyle diseases, as abdominal fat is more harmful for health than fat on the hips[5]. In connection with type 2 diabetes, there is a correlation between insulin resistance and waist-hip ratio, with a high amount of abdominal fat potentially increasing insulin resistance and thereby resulting in a worsening of type 2 diabetes[9].

The World Health Organization (WHO) has defined limit values for waist measurement in adult women and men[10]:

	Waist circumference – women	Waist circumference – men
Low risk of comorbidity	< 80 cm	< 94 cm
Moderately increased risk of comorbidity	80-88 cm	94-102 cm
Greatly increased risk of comorbidity	> 88 cm	> 102 cm

Table 10.10 shows that the average waist circumference is 111 cm, with the figure for men marginally higher than that for women. 73% of men have a waist circumference > 102 cm and 91% of women have a waist circumference > 88 cm (data not shown). The table also shows that by the end of the programme the average waist circumference of women has decreased by 2.7 cm and that of men by 4 cm. By the six-month follow-up evaluation, the average waist circumference decreases further, though more for women than for men.

Table 10.10 *Average change in waist circumference*

	Start	Start	End	Foll.	Δstart-end	Δstart-foll.	Δend-foll.
n	308	130	130	130	130	130	130
Waist circumference, cm, avg (95% CI)	111.1 (109.3;112.9)	111.9 (109.1;114.7)	108.5 (105.7;111.2)	107.9 (105.2;110.6)	-3.5* (-4.3;-2.7)	-4.0* (-4.9;-3.0)	-0.5 (-1.3;0.2)
Women	107.7 (104.9;110.5)	108.4 (104.0;112.9)	105.8 (101.5;110.1)	104.7 (100.4;109.1)	-2.7* (-3.8;-1.5)	-3.7* (-5.0;-2.4)	-1.1 (-2.2;0.0)
Men	113.4 (111.1;115.7)	114.2 (110.6;117.9)	110.2 (106.6;113.9)	110.1 (106.7;113.5)	-4.0* (-5.2;-2.9)	-4.2* (-5.5;-2.8)	-0.2 (-1.1;0.8)

** Statistically significant.*

10.6 Blood pressure

Citizens with type 2 diabetes often have high blood pressure. This increases the risk of cardiovascular disease and also influences the development of microvascular complications in the eyes and kidneys, which is why measuring and treating hypertension in people with type 2 diabetes is important[11].

For citizens with type 2 diabetes, the recommended blood pressure is ≤ 130/80 mm Hg[12].

Table 10.11 shows that average systolic and diastolic blood pressure are 144 and 86 mm Hg respectively. Both systolic and diastolic blood pressure decrease during the course of the programme at the Centre for Diabetes. It should be noted, however, that by the end of the programme average systolic blood pressure has decreased most, by 10.7 mm Hg, and then continues to fall through to the six-month follow-up evaluation, reaching 136 mm Hg.

Table 10.11 *Average blood pressure (BP)*

	Start	Start	End	Foll.	Δstart-end	Δstart-foll.	Δend-foll.
n	298	127	127	127	127	127	127
Sys BP, mm Hg, avg (95% CI)	143.8 (141.1;146.5)	147.5 (142.7; 152.2)	136.7 (133.9; 139.6)	135.9 (133.0; 138.9)	-10.7* (-15.0;-6.3)	-11.8* (-16.4;-7.2)	-0.8 (-3.2;-0.6)
Dia BP mm Hg, avg (95% CI)	85.5 (84.4;86.7)	86.2 (84.4;88.0)	84.7 (82.8;86.5)	85.5 (83.6;87.3)	-1.5* (-3.1;0.0)	-0.9 (-2.6;0.8)	0.8 (-0.8;1.0)

* *Statistically significant.*

Figures 10.12–10.15 show the distributions of systolic and diastolic blood pressure among citizens as well as the developments in these measurements over the course of the programme. The examinations were conducted in accordance with international standards[13].

At the start of the programme, four out of five citizens have systolic blood pressure > 130 mm Hg. By the end of the programme, this has decreased to around two out of three (Fig. 10.13). At the start of the programme, slightly more than two out of three citizens have diastolic blood pressure > 80 mm Hg, and at the end of the programme this is unchanged (Fig. 10.15).

Figure 10.12 *Distribution of systolic blood pressure (n=298)*

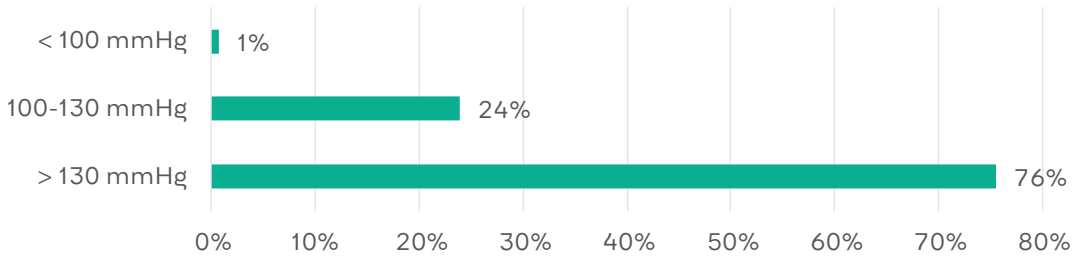


Figure 10.13 *Development in the distribution of systolic blood pressure (n=127)*

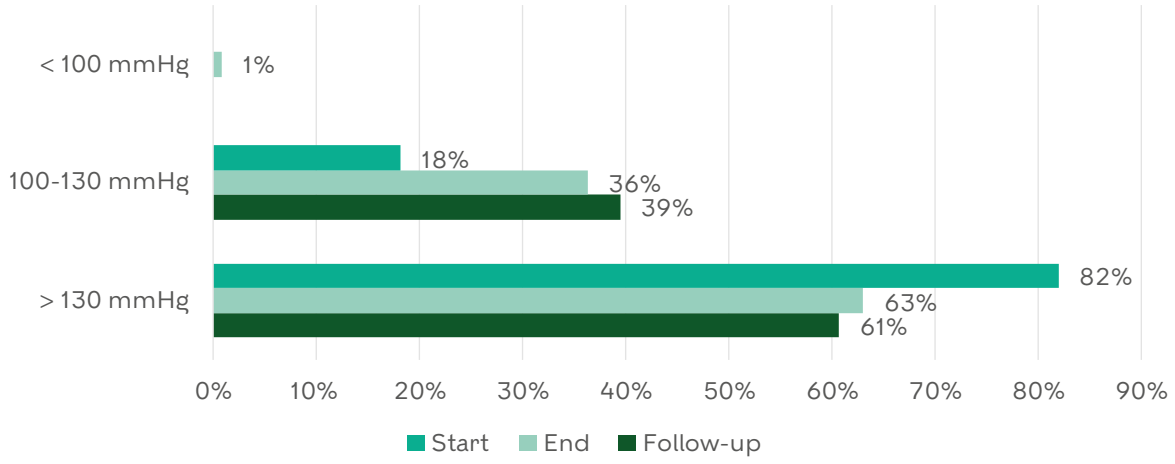


Figure 10.14 *Distribution of diastolic blood pressure (n=298)*

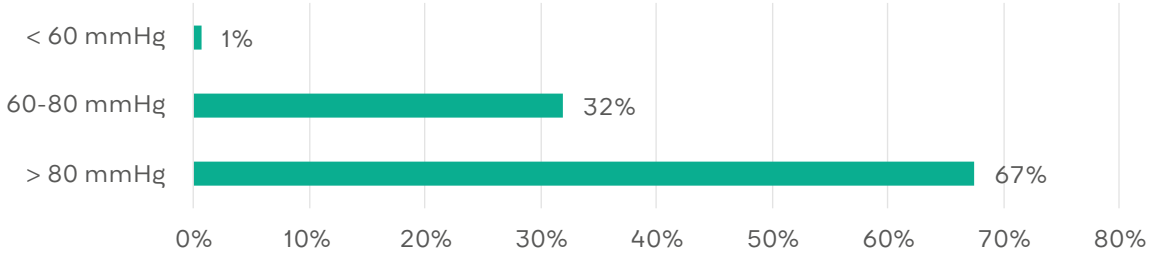
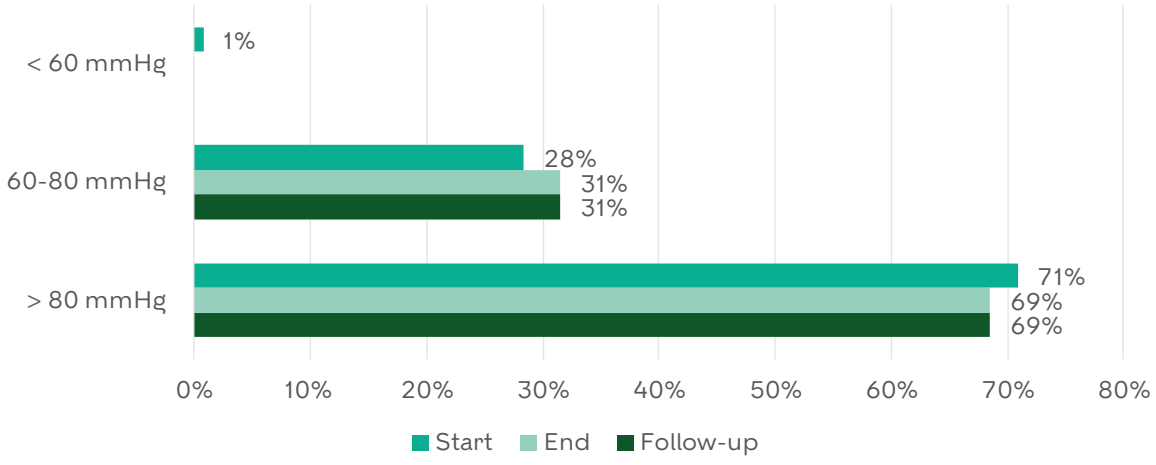


Figure 10.15 *Development in the distribution of diastolic blood pressure (n=127)*



10.7 Lipids

Untreated high cholesterol can in time result in arteriosclerosis and increase the risk of blood clots[14]. Citizens with type 2 diabetes are at increased risk of arteriosclerosis. High cholesterol can be treated with medication, but lifestyle changes can also have an impact[15].

For citizens with type 2 diabetes, total cholesterol should be < 4.5 mmol/l, while for citizens with diabetes and heart disease it should be < 4.0 mmol/l[16]. The therapeutic goals for citizens with diabetes are LDL cholesterol < 2.6 mmol/l for those not at high risk of cardiovascular disease and 1.8 mmol/l for those with, or at high risk of, cardiovascular disease[3].

This section shows the results for total cholesterol and LDL cholesterol.

Table 10.16 shows that total cholesterol is above the recommended level of 4.0 mmol/l for citizens with type 2 diabetes. It can also be seen that average LDL cholesterol is 2.0 mmol/l.

There is no evident change in total cholesterol over time. A significant increase is evident in LDL cholesterol from the start of the rehabilitation programme to the end, and from the start to the six-month follow-up evaluation.

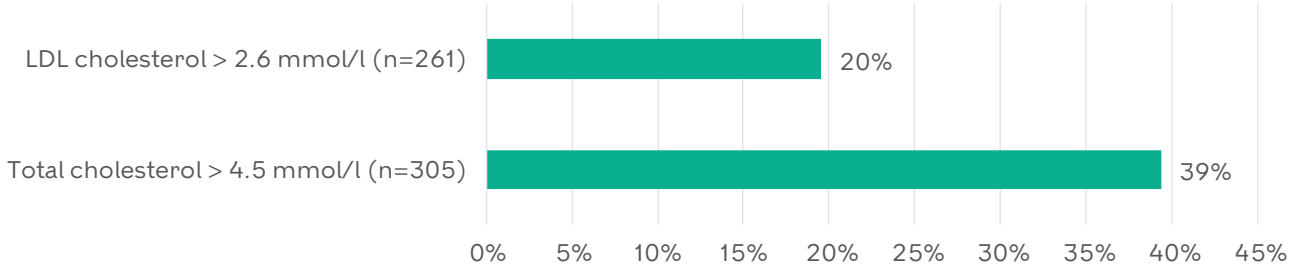
Table 10.16 *Total and LDL cholesterol plus average change*

	Start	Start	End	Foll.	Δstart-end	Δstart-foll.	Δend-foll.
n	305	121	121	121	121	121	121
Total cholesterol, avg (95% CI)	4.4 (4.3; 4.6)	4.4 (4.2;4.6)	4.4 (4.2;4.6)	4.4 (4.2-4.6)	0.0 (-0.2;0.2)	0.0 (-0.2;0.1)	0.0 (-0.2;0.2)
n	261	96	96	96	96	96	96
LDL cholesterol, avg (95% CI)	2.0 (1.8;2.1)	1.3 (1.2;1.3)	2.1 (1.9;2.3)	2.0 (1.8;2.2)	0.8* (0.6;1.0)	0.7* (0.5;0.9)	-0.1 (-0.2;0.1)

** Statistically significant.*

Figure 10.17 shows that just under two out of five citizens have high total cholesterol (> 4.5 mmol/l) and one in five have high LDL cholesterol (> 2.6 mmol/l).

Figure 10.17 *Distribution of high total cholesterol and LDL cholesterol*



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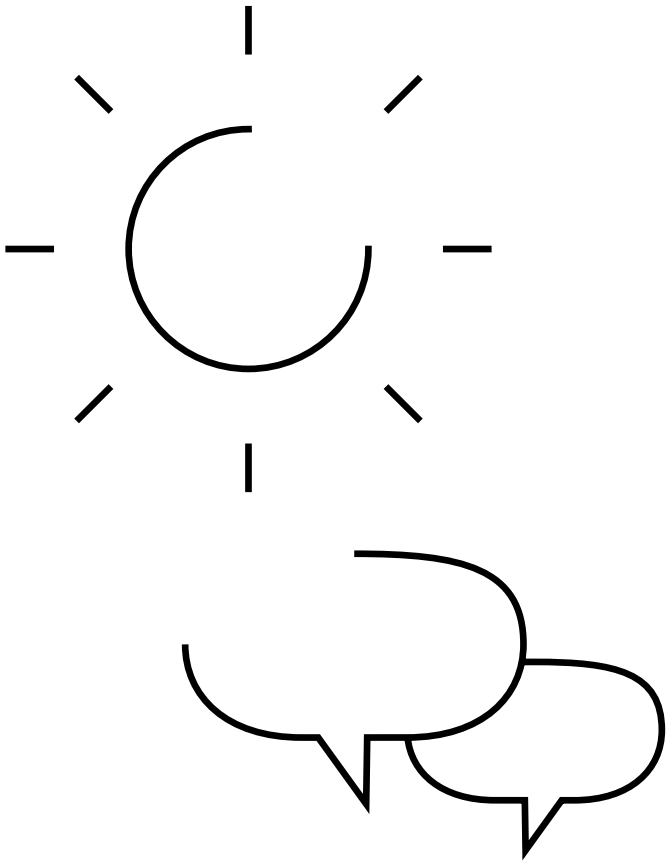


11
MOTIVATION AND GOALS

11 Motivation and goals

- Three out of four citizens rate their motivation to take part in a rehabilitation programme at the Centre for Diabetes as ≥ 7 (1 = not motivated, 10 = highly motivated).
- The majority of citizens feel that they have achieved their goals during the rehabilitation programme.
- Nine out of 10 citizens rate their motivation to make use of their new knowledge and habits as ≥ 7 (1 = not motivated, 10 = highly motivated).
- The majority of citizens feel that they have acquired new ideas for their day-to-day life.

Introduction

Motivation and goals are about the benefits that citizens derive from the rehabilitation programme. Among other things, the citizens' responses to questions about motivation and achievement of goals in the rehabilitation programme provide an insight into whether they feel they are coping with life with type 2 diabetes.

Chapter 11 describes the citizens' rating of motivation to participate at the start of the rehabilitation programme, achievement of goals and motivation to make use of the new knowledge they have acquired. Finally, it describes whether the programme has given the citizens coping skills that can be used going forward.

11.1 Citizens' motivation to participate in the rehabilitation programme

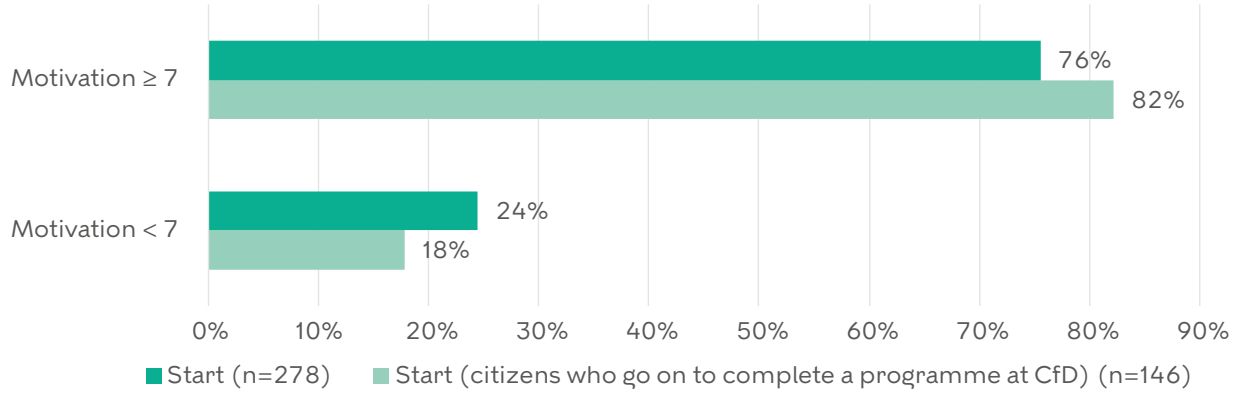
In order to evaluate whether citizens are motivated to take part in a rehabilitation programme, a 10-point visual analogue scale (VAS) was used, with 1 corresponding to 'not motivated' and 10 to 'highly motivated'. Research suggests that a citizen rating their motivation as seven or more has a high probability of achieving their goals[1].

The following questionnaire item provides the basis for this section:

- On a scale of 1 to 10, how motivated are you to take part in a programme at the Centre for Diabetes?

Figure 11.1 shows that at the start of the rehabilitation programme three out of four citizens rate their motivation as seven or higher on the VAS. Among those citizens who go on to complete the programme, four out of five rate their motivation as seven or higher. Thus, the majority of citizens referred to the Centre for Diabetes are motivated to take part in a programme.

Figure 11.1. *Motivation to take part in a rehabilitation programme at the Centre for Diabetes*



Motivation at the start of the programme

Figure 11.2 shows that virtually all citizens rate their motivation as five or higher on the VAS, and only a very small percentage give ratings that are so low that they can be considered highly unmotivated to take part in the programme.

Figure 11.2 *Distribution on the VAS*

11.2 Achievement of goals

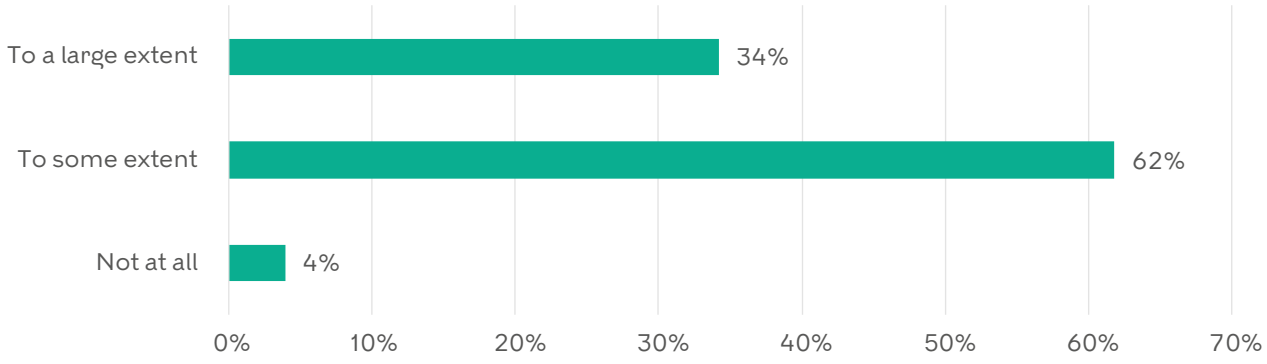
This section describes whether citizens feel that they achieved the goals set at the start of the programme. The citizens were questioned about this at the end of the programme and again six months later.

The following questionnaire item provides the basis for this section:

- To what extent do you consider you achieved your goals?

Figure 11.3 shows that at the end of the rehabilitation programme virtually all citizens consider that they benefited from the programme. One in three consider that they achieved their goals 'to a large extent', and two out of three consider that they achieved their goals 'to some extent'. A very small percentage consider that they did not achieve their goals.

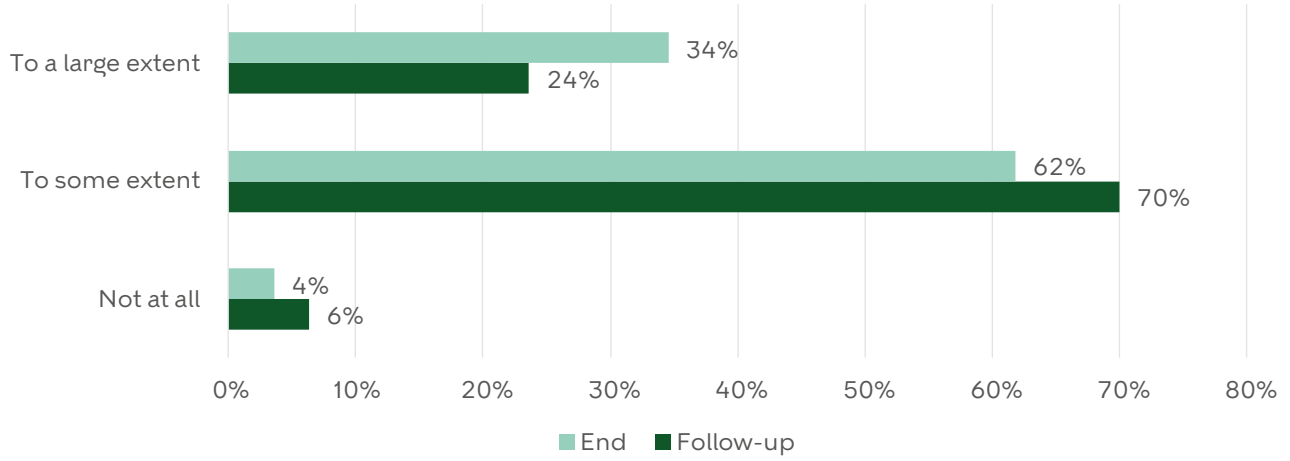
Figure 11.3 *Citizens' end-of-programme assessment of whether they achieved their goals (n=143)*



Development

Figure 11.4 shows the development in citizens' assessment of whether they achieved their goals from the end of the programme to the six-month follow-up evaluation. The percentage of citizens who consider that they achieved their goals 'to a large extent' has decreased by the six-month follow-up evaluation. Correspondingly, there is an increase among citizens who consider that they achieved their goals 'to some extent'.

Figure 11.4 *Development in citizens' assessment of whether they achieved their goals (n=110)*



11.3 Motivation to make use of new knowledge and habits

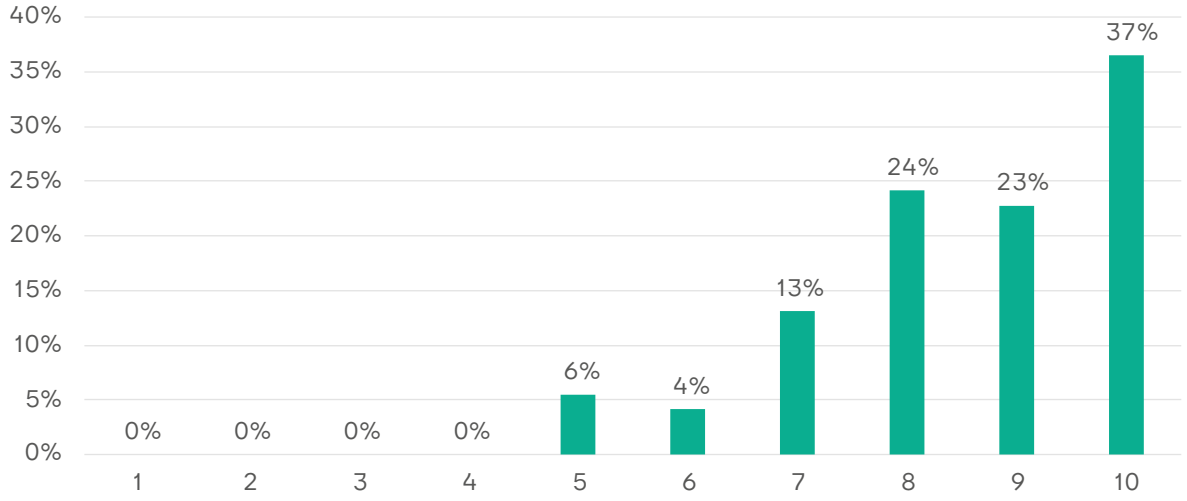
This section describes whether citizens consider that they can make use of their new knowledge and habits in their day-to-day lives.

The following questionnaire item provides the basis for this section:

- On a scale of 1-10, how motivated are you to make use of your new knowledge and habits?

Figure 11.5 shows that at the end of the programme nine out of 10 citizens rate their motivation to make use of their new knowledge and habits as seven or higher on the VAS. Slightly more than one in three score their motivation as 10, while no citizens score their motivation below 5.

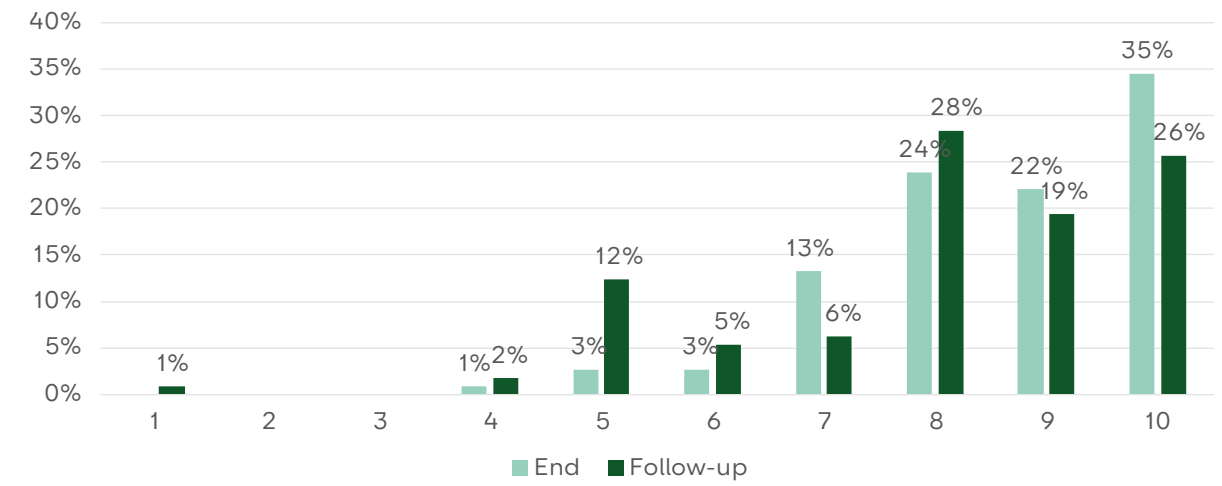
Figure 11.5 *Citizens' motivation to make use of their new knowledge and habits (n=154)*



Development

Figure 11.6 shows the development in citizens' perception of their motivation to make use of their new knowledge and habits from the end of the programme to the six-month follow-up evaluation. From the end of the programme to six months later, the motivation decreases, with an increased percentage of citizens rating their motivation at 7 or lower on the VAS, though still very few at lower than 5.

Figure 11.6 *Development in citizens' motivation to make use of their new knowledge and habits (n=113)*



11.4 Change in day-to-day life

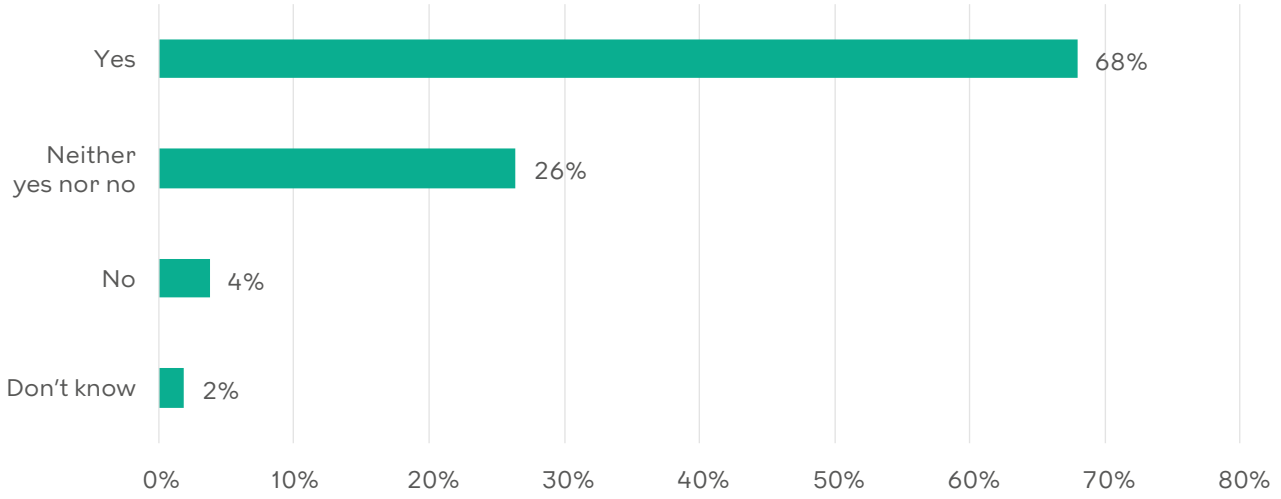
This section examines whether citizens have been inspired to make changes in their day-to-day lives. One of the goals of the rehabilitation programme is to create and maintain the desired changes[2].

The following questionnaire item provides the basis for this section:

- My programme at the Centre for Diabetes has given me new ideas for my day-to-day life going forward.

Figure 11.7 shows that the majority of citizens consider that they have acquired new ideas for day-to-day life with type 2 diabetes. One in four citizens answer 'neither yes nor no'. A small percentage answer 'no' or 'don't know'.

Figure 11.7 *New ideas for day-to-day life going forward (n=159)*



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Appendix is not included in this translated version

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