Time to tip the scales: tackling overweight and obesity in primary care

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Chapter 6

General discussion

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Obesity is a major global health problem, leading to chronic disease and increased mortality (1, 2). The rise in obesity-related diseases results in increased healthcare costs due to the need for treatment and frequent medical visits (3, 4). Obesity is also a complex disease, influenced by behavioural, environmental, social, and genetic factors (5). Because of the increased prevalence of obesity, effective prevention and early identification of patients at risk are crucial. Primary care plays a key role in this, as general practitioners are often the first point of contact for these patients. Therefore, this thesis aims to provide a contribution to the improvement of obesity management in primary care. In this final chapter, main findings and overall perspectives of obesity are discussed, covering the following topics: the definition of obesity, developments in treatment, and the role of primary care in the management of obesity. Subsequently, the implications for clinical practice are examined, followed by future perspectives and recommendations for future research.

Main findings

Part I: Current practices

The first aim was to examine the current practices of obesity management in primary care. **Chapter 2** examined current recording practices of body mass index, overweight, and obesity in primary care. In this chapter we analysed routine healthcare data from 676,708 electronic health records and found that the incidence rates of recorded body mass index increased from 2007 to 2023. During the COVID-19 pandemic (2020-2022), the incidence rates temporarily decreased, before increasing again. Recording body mass index is not currently standard practice. General practitioners recorded body mass index for about one-third of all adults, and mainly for those with chronic diseases (chronic obstructive pulmonary disease, type II diabetes, hypertension, and osteoarthritis). Those with mental health conditions (depression and eating disorders) were less likely to have their body mass index recorded. In **Chapter 3,** a qualitative study using focus group discussions with general practitioners was conducted. In this study we explored the barriers and facilitators to three target behaviours of general practitioners in addressing obesity: discussing weight, diagnosing, and referring patients with obesity. For discussing weight, the main barriers identified were a presented complaint unrelated to obesity, concerns about a negative response from the patient, and worries about obesity being a sensitive subject to discuss. The general practitioners mentioned that a long-term trustworthy relationship facilitated in discussing weight. Barriers related to diagnosing patients with obesity were more related to resources, e.g., lack of (appropriate) equipment and time. For referring

patients with obesity, barriers were lack of accessible referral options nearby and doubts about the positive effects of the referral. In conclusion, different barriers for discussing weight, diagnosing, and referring patients with obesity were identified, underscoring the importance for tailored interventions to these three behaviours rather than addressing obesity in general. Attention should be paid to establishing long-term relationships, addressing general practitioners' beliefs about consequences, and creating a supportive environment with sufficient time and resources.

Part II: Identification of high-risk patients

The second aim was to improve the identification of patients with obesity at increased risk of further long-term weight gain or cardiovascular disease. In **Chapter 4**, we investigate the association between anxiety, depression, negative life events and quality of life with weight change over ten years in a middle-aged population-based cohort with overweight or obesity using data from the NEO study. We concluded that depressive symptoms and distant negative life events were associated with weight gain over ten years. Anxiety symptoms and quality of life were not associated with either weight gain or weight loss. **Chapter 5** examines the value of measuring waist circumference in primary care in a mixed-methods study consisting of three parts: first, current recording practices of general practitioners in measuring waist circumference; second, barriers and facilitators of general practitioners in measuring waist circumference; and third, the contribution of measuring waist circumference in identifying patients at increased risk of cardiovascular disease. We found that the incidence rates of recorded waist circumference in primary care decreased between 2007-2023. Barriers for general practitioners to measuring waist circumference included discomfort, inability to measure accurately, lack of tape measure, and perceived uselessness. Facilitators for general practitioners included the availability of measuring tape and the comprehension that increased waist circumference is a cardiovascular risk factor. Measuring waist circumference alone would already identify almost 90% of individuals at intermediate predicted cardiovascular risk and 93% at high predicted cardiovascular risk. In addition, adding an increased waist circumference as an eligibility criterion for cardiovascular risk assessment in the guideline *cardiovascular risk management* of the Dutch College of General Practitioner is of added value. It leads to the identification of an additional 6.4% of patients at intermediate predicted cardiovascular risk. In conclusion, measuring waist circumference may be a valuable addition to cardiovascular risk management in primary care, as it identifies patients at risk of cardiovascular disease and is a low-cost, simple assessment. However, the barriers need to be addressed.

All findings considered, this thesis shows that both body mass index and waist circumference were underrecorded in primary healthcare records. Overcoming the barriers for general practitioners to discussing weight, diagnosing and referring patients with obesity requires not only improving knowledge and skills, but also establishing long-term relationships, creating a supportive environment and addressing their beliefs about consequences. Proactive attention is needed for patients with depressive symptoms and those who have experienced negative life events, as they are more likely to gain weight over time. In addition, measuring waist circumference is a cost-effective and accessible tool that identifies patients at increased risk of developing cardiovascular disease.

Overall perspectives

In this paragraph we discuss the views on the definition of obesity, the developments in the treatment of obesity, and the role of primary care in obesity management (preventive, reactive or both).

Views on the definition of obesity

Although the World Health Organization recognises obesity as a chronic disease (6), the idea of obesity as a chronic disease remains highly controversial, with ongoing debate about its definition and diagnostic criteria (7). Traditionally, body mass index, calculated by dividing weight in kilograms by height in metres squared, has been used to assess obesity (8). While the body mass index has guided treatment decisions for decades, it has limitations. Body mass index does not distinguish between fat and muscle, nor does it take into account the body fat distribution, both of which are essential for assessing health risks. These evolving insights in obesity and its health risks highlight the need for a more comprehensive approach to identifying and managing obesity. A study (2025) by Rubino et al., introduced obesity as preclinical obesity (excess body fat without current organ dysfunction but with an increased risk of developing clinical obesity) and clinical obesity (excess body fat with symptoms of organ dysfunction or functional limitation), which can guide clinical decision making. They recommended that excess adiposity should be confirmed through a direct measurement of body fat (e.g. by Dual-energy X-ray absorptiometry (DEXA), bioimpedance, etc), wherever available, or at least one anthropometric measurement (e.g. waist circumference, waist-to-hip ratio, or waist-to-height ratio) in addition to body mass index. This approach greatly reduces, but does not eliminate, both overdiagnosis and underdiagnosis of obesity status (9). Other studies have also confirmed the importance of these additional measurements (10, 11). Among these, waist circumference is particularly useful in identifying patients at increased risk of cardiovascular diseases (**Chapter 5**). In addition, it is a practical

low-cost tool that is easy to perform in a clinical setting, especially compared with for example laboratory tests (12-14).

The under recording of body mass index (**Chapter 2**) and waist circumference (**Chapter 5**) in primary healthcare records suggests that these diagnostic criteria for obesity described above are not yet routinely applied in primary care. Although the incidence rate of body mass index measurements increased in primary care, the decrease in waist circumference measurements may represent a missed opportunity. Figure 1 shows the trends in both measurements over time (**Chapters 2** and **5**), along with relevant guidelines, important Dutch political agreements, international literature, and the prevalence of obesity in the Netherlands in previous years. During the 1990s, several studies highlighted the importance of measuring waist circumference (14-16). Nevertheless, in 1997, the World Health Organisation established body mass index ≥30kg/m^2 as the definition of obesity, which led to the standard parameter for defining obesity in guidelines (17). From 2006 to 2011, the guideline *cardiovascular risk management* of the Dutch College of General Practitioners recommended measuring body mass index and waist circumference as part of the physical examination (18). This recommendation was followed by a marked increase in recorded measurements in Dutch primary care (**Chapter 5**). After 2011, the focus of the guidelines shifted to measuring body mass index alone, with waist circumference listed as an optional additional measurement (19, 20). Interest in waist circumference has resurfaced since 2020 (13), with its reintroduction into national guidelines (21, 22), which may improve clinical practice in obesity management in primary care and support a renewed uptake of waist circumference measurements. Despite this renewed attention, body mass index currently remains the primary criterion for reimbursement of bariatric surgery (23). In contrast, both body mass index and waist circumference are included in the eligibility criteria for the combined lifestyle interventions (24). Taken together, the evidence suggests that we are currently in a transitional phase in which waist circumference is gaining recognition as an important clinical measure alongside the body mass index but has not yet been fully integrated into routine practice and policy.

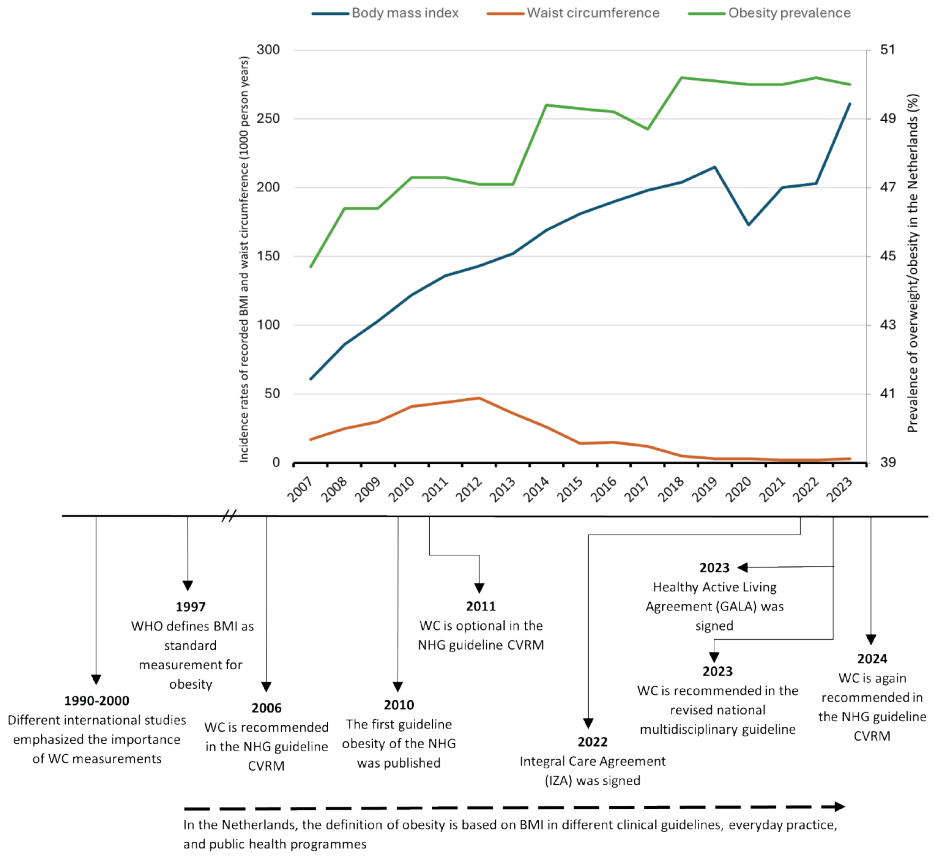

Figure 1 Incidence rates of recorded body max index and waist circumference (results of **Chapters 2** and **5**) in Dutch primary care and prevalence of overweight and obesity in the Netherlands
WC: waist circumference, BMI: body mass index, WHO: World Health Organization, CVRM: cardiovascular risk management, NHG: Dutch College of General Practitioners

Developments in treatment of obesity

Below, two treatment options for obesity that are currently highly relevant in primary care are discussed.

Combined lifestyle interventions

From 2019, health insurances in the Netherlands have started reimbursing lifestyle interventions for patients with a body mass index ≥25 kg/m^2 and related health problems (comorbidity or increased waist circumference), or a body mass index ≥35 kg/m^2 (24).

Studies showed an average weight loss of 2-3 kg in the first year after starting the intervention, although long-term weight effects remain uncertain (25-28). An annual monitoring report (2024) by the National Institute for Public Health and the Environment (RIVM) reported an average weight loss of 5% and an improvement in quality of life after completing the intervention (29). These findings emphasise the importance of managing patients' expectations by presenting improved quality of life as the main goal of the GLI, rather than focusing solely on reducing body mass index and waist circumference. General practitioners should address this during the referral process in order to prevent dropouts and encourage successful completion. New insights into the pathophysiology of obesity underscore the challenges we face when treating obesity. Hinte et al. showed that even after weight loss, adipose tissue retains an epigenetic memory of obesity, maintaining metabolic changes that predispose individuals to weight regain (30). This phenomenon, known as fat memory, complicates long-term weight management and makes sustained weight loss a difficult goal to achieve. Despite the short-term benefits of combined lifestyle interventions, the persistence of fat memory means that individuals face ongoing challenges in maintaining long-term weight loss and improving metabolic health. These findings help to explain why general practitioners in our focus groups expressed limited confidence in the long-term effectiveness of lifestyle interventions and dietitians (**Chapter 3**) and highlight the need for more realistic expectations and broader outcome measures that extend beyond weight loss alone.

Pharmacological treatment

At the time of starting this thesis (2020), advances in obesity management include the introduction and increasing use of new pharmacological treatments for obesity. Drugs such as glucose-dependent insulinotropic polypeptide (GIP) and glucagon-like peptide-1 receptor agonists (GLP-1) such as semaglutide, liraglutide and tirzepatide (31-34), originally developed for type 2 diabetes, are now increasingly prescribed for obesity. A randomised control trial (SURMOUNT trial) published by Jastreboff et al. showed that the use of tirzepatide resulted in an average weight loss of 19% and 20% (at weekly doses of 10 mg and 15 mg, respectively), compared with a one percent weight loss with placebo over more than three years (33). The findings of this thesis (**Chapters 4** and **5**) enable general practitioners to identify patients at high risk who may benefit from these pharmacological treatments. However, ethical and practical challenges arise for general practitioners when considering the prescription of these drugs. For example, questions about long-term effectiveness, accessibility, affordability, side-effects, and their role in primary care. At present, only liraglutide and naltrexone/bupropion are reimbursed for obesity treatment in the Netherlands, provided that the combined lifestyle intervention has proven unsuccessful (35).

Current reimbursement policies ensure that pharmacological treatments are used as a complement to lifestyle changes rather than replace them. At the same time, it poses practical challenges, as patients with greater financial resources may choose to pay for the treatment themselves, potentially leading to inequalities in healthcare. In addition, there may be concerns that these drugs may be seen as substitutes for lifestyle and behavioural changes, resulting in a potential need for lifelong use. The literature supports these concerns, pointing to long-term use and gastrointestinal side-effects (32, 33, 36, 37). Furthermore, continued media attention on these treatments has raised patient expectations, which may put pressure on general practitioners. In the focus group study (**Chapter 3**), general practitioners mentioned a poor doctor-patient relationship as a barrier to discussing weight. Increased demand for these drugs might influence the doctor-patient relationship and might hinder open discussions about all possible treatments for obesity in primary care. In contrast, the availability of these drugs could also address some of the barriers identified in **Chapter 3**, such as doubts about the effect on weight change, the lack of confidence in the effectiveness of treatments, and the lack of treatment options. In conclusion, the introduction of these drugs presents new challenges for general practitioners, but also has the potential to address some of the barriers that general practitioners face in managing obesity.

Primary care: preventive, reactive, or both?

General practitioners play a crucial role in identifying patients at risk of obesity and its related diseases, as discussed in **Chapters 4** and **5**. However, their efforts alone are not enough to tackle obesity. In this section, we further explore three key issues in the management of obesity: the need for a collaborative approach to obesity prevention, the role of general practitioners in identifying obesity-related conditions, and patient perspectives on obesity management.

Obesity prevention: a collaborative approach

The Dutch healthcare system faces growing pressure from an ageing population, workforce shortages, increasing demand for care and escalating costs, alongside the growing obesity epidemic. To ensure sustainability and accessibility, the Integral Care Agreement (IZA) was introduced in 2022 and signed by the national government, health insurers, healthcare providers, and other stakeholders (38). The IZA emphasises the importance of collaboration between healthcare providers, municipalities, and social services. Complementing this, in 2023 the Healthy and Active Living Agreement (Gezond en Actief Leven Akkoord, GALA) was developed to support local governments in promoting health, preventing diseases, and reducing health inequalities (39). Tackling obesity requires a comprehensive strategy that goes beyond the scope of primary care alone. While general practitioners play a central role in identifying individuals

with obesity, the general practitioners in our focus groups discussions mentioned the need for a broader public health approach, including taxes on sugar-sweetened beverages, school-based prevention programmes, and local government initiatives (**Chapter 3**). The priorities of the IZA and GALA, such as accessible primary care, regional collaboration, promoting a healthy lifestyle and environment, and reducing health inequalities, offer important opportunities to prevent and manage obesity through a more coordinated, multidisciplinary approach.

Identifying obesity-related diseases

As we described in our introduction (Figure 2 in the introduction), obesity is associated with various diseases. One of the main challenges in preventing obesity and its related diseases is that primary care in the Netherlands is largely demand-driven. This poses a challenge to early detection of individuals at increased risk of cardiovascular disease. The guideline *cardiovascular risk management* of the Dutch College of General Practitioners recommends programmatic as well as opportunistic screening (21). According to Leemrijse et al, 25% of the Dutch general practitioners use opportunistic screening, 20% use programmatic screening, and almost 20% use both methods. However, almost 37% of general practitioners do not use any form of screening (40). Programmatic screening involves systematically inviting patients at risk for consultations, while opportunistic screening takes place during routine consultations when risk factors, such as obesity or increased waist circumference, are noticed during an encounter for other reasons. Each approach has its limitations. Programmatic screening, while more effective in detecting cases in the short term, has not been shown to have long-term health benefits and is therefore not considered cost-effective (41, 42). Opportunistic screening may miss cases, because some patients rarely visit their general practitioner to discuss their weight, and general practitioners often experience a barrier to raising the issue if the reason for encounter is unrelated to obesity (**Chapter 3**). Despite the early detection potential of both approaches, screening has inherent limitations. The report of the Council for Public Health and Society (RVS) criticised a prevention policy that relies heavily on individual medical interventions such as screening (43). The RVS emphasizes that health problems are largely influenced by social and environmental factors. Effective prevention, therefore, requires structural societal interventions that go beyond the medical domain. According to the RVS, screening should not be the cornerstone of health policy, but rather one of the tools within a broader public health strategy. Although each screening approach currently has its limitations, simple measurements such as body mass index and waist circumference, are valuable low-costs tools for the early identification of patients at increased risk of cardiovascular disease in primary care (**Chapter 5**) (44). Also, raising public awareness of the link between (abdominal) obesity

and its related diseases may encourage patients to present to their general practitioner earlier, making opportunistic screening more feasible and acceptable.

Patient perspectives on obesity management

Although not specifically addressed in this thesis, the patient perspectives on obesity management are an important area for consideration. While policymakers and healthcare providers may express a willingness to tackle obesity, it is crucial to understand what patients expect from their healthcare providers. A systematic review of 21 qualitative studies found that discussions about weight between healthcare providers and patients were less frequently started than patients thought desirable (45). Some patients reported feeling unworthy of medical attention, others felt that doctors did not consider being overweight to be a serious health risk, and some felt stigmatised due to the lack of discussion about weight. Despite these concerns, patients generally responded positively when doctors acknowledged their efforts to lose weight, offered weight loss support, and provided ongoing follow-up (45). As we explored general practitioners' barriers and facilitators in measuring waist circumference in **Chapter 5**, it is important to highlight that another qualitative study conducted in a primary care population found that patients had few concerns about waist circumference measurements being taken by healthcare providers (46). These findings suggest that such measurements are broadly acceptable during routine consultations in general practice. Finally, a randomised controlled trial by Aveyard et al. showed that a very brief behavioural advice from general practitioners, suggesting that weight loss would benefit the patient's health, was acceptable to patients and effective in reducing the mean weight of the population (47).

Taken together, there is a gap in current preventive care practices, with missed opportunities for the early identification of patients at risk of cardiovascular disease. This highlights the key role of primary care in identifying and managing patients with obesity. However, its impact on obesity must be coordinated with broader community and policy efforts. Effectively tackling obesity requires collaboration between public health authorities, policymakers, and primary care, integrating both preventive and reactive strategies. Raising public awareness of the link between obesity and related diseases is also essential. By promoting a collaborative, patient-centered approach, we can better address the obesity epidemic and its associated health risks.

Implications for practice

The results of the studies described in this thesis lead to several implications for obesity management in primary care.

Implications for policymakers

- *Revision of the national guideline obesity of the Dutch College of General Practitioners (NHG).* At the time of writing this thesis (2025), the national guideline *obesity* of the Dutch College of General Practitioners (NHG) dates from 2010 (48). This outdated guideline is concerning, particurlarly given the increase in prevalence of obesity over the past fifteen years, with almost 16% of Dutch adults having a BMI ≥ 30 kg/m² (49). In addition, a growing body of updated European guidelines on obesity management could provide a valuable foundation for updating the Dutch guideline (50, 51). The absence of an up-to-date national guideline for general practitioners means that general practitioners must rely on outdated recommendations to manage a condition that is increasingly recognised as both prevalent and complex. This highlights the urgent need for an updated national guideline for general practitioners that reflects current evidence and supports them in effectively managing obesity. Encouragingly, a revised guideline is currently under development and is expected to be published by the end of 2025. In addition, a new practice guide on overweight and obesity in general practice has recently been published. This guide is based on the recently updated national multidisciplinary obesity guideline (22, 52). This is a practical guide for general practitioners that supports them in addressing obesity.
- *Including waist circumference in guidelines and decision-making processes.* Currently, body mass index is the primary criterion for diagnosis and treatment decisions in obesity management among healthcare providers. However, the findings presented in this thesis show that an increased waist circumference, which is associated with cardiovascular diseases (12-14, 53-55), identifies an additional 6.4% of individuals at increased cardiovascular risk (**Chapter 5**). This suggests that measuring waist circumference is a valuable additional risk factor in determining who is eligible for a cardiovascular risk assessment. Therefore, we recommend adding waist circumference as an eligibility criterion for cardiovascular risk assessment in the current guideline *cardiovascular risk assessment* of the Dutch College of General Practitioners (NHG), alongside existing risk factors (e.g., premature family history of cardiovascular disease, obesity ≥30kg/m²). We also recommend including waist circumference in the decision-making process for both bariatric surgery and the prescription of pharmacological treatments.

Personal experience of the author (general practitioner in training)
Ms Y, 45 years old, came to my consultation with a persistent cough. We discussed her symptoms, and we determined a way of addressing them. Throughout the consultation, I found myself thinking that she likely had a high BMI, yet I could not find any mention of it in her medical record. An internal dialogue started on whether to address the topic of her weight. Why am I hesitating? What is holding me back?

As we were wrapping up the consultation and she was about to stand up, I felt I could not let the moment pass. At the last minute, I asked, *"Would you mind if I ask you something about your weight or would that be uncomfortable?"*

She replied, *"Of course, go ahead,"* and immediately began sharing her story. I could see that it brought her relief. I recorded her self-reported weight in the medical record.

Afterwards, I remembered the focus group discussion I had conducted. Why was it so difficult for me to raise the issue? What would make this easier next time? This moment suddenly made clear how challenging it can be to address obesity in practice – even after spending three years researching the topic.

Implications for general practitioners

The personal experience of the author above is presented to illustrate the challenges general practitioners (in training) face, and the need to support them in initiating conversations about weight and addressing obesity in routine consultations. We present several recommendations based on the findings of this thesis which could support general practitioners in addressing obesity.

- *Continuity of care:* aim to establish long-term trustworthy relationships between doctors and patients, as a trusting relationship facilitates discussing weight (56). The increasing presence of locum general practitioners in Dutch primary care threatens continuity of care (57, 58), which needs to be addressed in order to provide adequate support for obesity in primary care.
- *Equipment in every consultation room:* provide a scale and measuring tape (for both waist circumference and height) in every consultation room.
- *Routine measuring body mass index and waist circumference*: consider routinely measuring BMI and waist circumference.
- *User-friendly electronic health record system:* ensure that BMI and waist circumference can be easily recorded in the electronic health records.

- *Education and up-to date information:* keep abreast of the latest developments in the treatment of obesity. During the focus group discussions (**Chapter 3**) conducted in 2020-2021, some general practitioners were unfamiliar with the combined lifestyle intervention and pharmacological treatments were discussed to a limited extent at that time. This illustrates the rapid advances in obesity management in recent years, particularly the growing emphasis on pharmacological treatments. To ensure that general practitioners can effectively manage obesity, it is important to provide them with ongoing support and education.
- *Collaboration between practice nurses:* ensure close collaboration between the practice nurse for physical health (*Praktijkondersteuner-somatiek)* and the practice nurse for mental health *(Praktijkondersteuner-GGZ)* when treating patients with obesity and depressive symptoms or who have experienced negative life events. This thesis highlights the need for improved collaboration to address both the mental and physical dimensions of obesity in a coordinated and integrated way.

Methodological considerations

This thesis combines several research methods, including analysis of routine primary healthcare records, qualitative focus group discussions with general practitioners, and a cohort study with almost ten years of follow-up, to provide a comprehensive understanding of obesity management in primary care. Together, these different study approaches provide a broad perspective on the challenges and opportunities in obesity management. The implementation of both qualitative and quantitative findings into clinical practice is essential to improve obesity management (59).

The generalisability of the findings should be interpreted with caution for healthcare settings outside of the Netherlands. The data used in this thesis are specifically related to the Dutch primary healthcare system, which has its own unique structure and practice. While the findings are valuable in the Dutch context, their applicability to other healthcare systems may be limited. Additional studies in different healthcare settings and populations are needed to assess the broader relevance of these findings. It is also important to note that the findings of this thesis are not generalizable to children, as the study focused exclusively on adults. This is an important limitation, particularly as children are a key target group for obesity prevention. Addressing obesity early in life is crucial to limiting the long-term health and societal consequences of the condition.

Routine healthcare data

For the routine healthcare data, we used data from the Extramural LUMC Academic Network (ELAN). A key strength of this data was that it allowed us to analyse real-life clinical care over multiple years, without the bias associated with self-reported data. It also comprised >1 million electronical health records. A limitation of using routine healthcare data is that its quality depends on the documentation practices of healthcare professionals. As the data is recorded during regular consultations and not specifically for research purposes, there may be issues with completeness and consistency of the information.

Focus group discussions

Qualitative research aims to reflect diversity rather than achieve generalisability. However, its relevance to clinical practice partly depends on the extent to which findings can be transferred to other contexts (60). In **Chapter 2**, we presented three real-life examples to support readers in assessing the transferability of our findings to their own settings. In the focus group discussions, we examined three specific behaviours of general practitioners when addressing obesity: discussing weight, diagnosing, and referring patients with obesity. Although this structured approach enabled us to generate specific, actionable insights, the wide scope of the discussions limited the opportunity to explore certain topics in depth. For example, the topic of waist circumference might have benefited from more focused attention. Despite these limitations, data saturation was reached after six focus groups, suggesting that no additional barriers or facilitators would have emerged with further discussions.

The Netherlands Epidemiology of Obesity study

In this thesis, we used data from the Netherlands Epidemiology of Obesity (NEO) study, a population-based cohort study. A key strength is the broad range of baseline data available, which allows for comprehensive analyses. A limitation of this study is the oversampling of individuals with a body mass index ≥27 kg/m², which may limit the external validity of the findings to Dutch primary care settings. However, since the time of data collection (2008-2012), the prevalence of overweight and obesity has increased, making the study population increasingly more representative of the general population. Another limitation is that the self-reported data at baseline could not be verified against diagnosis recorded in electronic health records. However, de Boer et al. found that there was 98% agreement between self-reported diabetes and the reference standard, and 99% agreement between an ICPC-coded (International Classification of Primary Care) diabetes diagnosis and the reference standard, suggesting that self-reported data can be reliable for certain conditions (61). Lastly,

the study population consist predominantly of white individuals which may limit the generalizability of the findings to more ethnically diverse populations.

Future perspectives and recommendations for future research

Considering the low recording practices observed in this thesis, measuring body mass index and waist circumference should be more seamlessly integrated into daily workflows, possibly through digital prompts or assessment during an intake consultation or before regular consultations by the medical assistant. Another innovative solution could be the development of a patient self-assessment system in the waiting room, allowing patients to independently measure their body mass index and waist circumference. These anthropometric measurements could then be automatically uploaded to the patient's medical record, reducing the burden on healthcare providers, and ensuring consistent documentation. This approach would streamline the recording process and enable patients to take an active role in monitoring their health. Further research is needed to design, implement and evaluate these interventions in order to support the routine measurement of body mass index with waist circumference in primary care.

An increasing range of pharmacological treatments for obesity is likely to become available in the coming years. Current injectable drugs (e.g. liraglutide, tirzepatide) will increasingly be replaced by oral drugs, and these treatments are becoming increasingly effective (62, 63). Currently, these treatments are relatively expensive. In the future, however, patents will expire, reducing the costs of these treatments. This trend is expected to continue in Europe over the next five to ten years, leading to the potential widespread adoption of these therapies (64). Given these new developments in pharmacological treatments for obesity and the growing interest of patients in pharmacological treatment options, future research should focus on understanding the barriers that general practitioners face in prescribing these newly available drugs for obesity. Addressing the barriers that general practitioners face in prescribing these drugs is essential for the appropriate and increased use of these treatments in primary care.

Another important direction for future research is to unravel the multifactorial nature of obesity and the underlying mechanisms that contribute to obesity-related diseases which are beginning to be elucidated (5, 65). Some not yet identified interactions, mechanisms and processes may prove crucial to a full understanding of the condition and its consequences. For instance, not all individuals with obesity face the same health risks. Some can live with what is known as 'metabolically healthy obesity,' while others are at greater risk of developing obesity-related diseases (66). Future research should

focus on identifying high-risk patients more effectively in order to develop targeted and personalised prevention and treatment strategies. Artificial intelligence (AI) can play a crucial role in this process by analysing complex data patterns to improve patient identification and risk stratification, enabling more precise and personalised care.

Time to tip the scales

Obesity management in primary care needs to be adapt further to the increasing prevalence of obesity: *Time to tip the scales and find balance.* Addressing the key insights of this thesis, which highlight the importance of implementing both quantitative and qualitative findings, can contribute to a more effective approach to obesity management in primary care. Ultimately, obesity management should focus more on prevention rather than treating its effects.

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