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Co-Prevalence Of Obesity, Diabetes, And Cardiorenal Diseases In Turkey: Insights From A Delphi Panel

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ABSTRACT

Background: Obesity, diabetes, and cardiorenal diseases are pressing public health concerns in Türkiye, significantly contributing to morbidity and mortality. Despite their importance, current data on their prevalence and co-prevalence are limited and outdated. This study aims to examine the coexistence of these conditions and explore shared risk factors within the Turkish population.
Method: The panel utilised data from the TurkStat Health Survey conducted by the Turkish Statistical Institute (TÜİK), which included approximately 29.000 participants. Participants' responses were analysed to calculate the prevalence and co-prevalence of obesity, diabetes, and cardiorenal diseases. Additionally, a systematic literature review was conducted using PRISMA guidelines to analyse national and international peer-reviewed articles. A Delphi panel of internists, cardiologists, endocrinologists, and nephrologists was established to evaluate the findings and address data limitations. This three-pronged approach ensured the most accurate and reliable estimates, providing insights for effective health strategies and disease management.
Results: According to TÜİK data, the prevalence of diabetes was reported as 13%, while the literature projected it at 15.7%, and the Delphi panel estimated it at 19%. The prevalence of obesity was reported as 22% by TÜİK, 36% in the literature, and 38% by the expert panel, which attributed discrepancies to underreporting of weight in self-reported data. Similarly, the prevalence of cardiovascular disease was reported as 8% in TÜİK data, 6% in the literature, and adjusted to 10.9% by experts.
Conclusion: These findings highlight the tendency of existing studies to underestimate disease prevalence, necessitating expert panels to obtain accurate assessments to better inform national health needs. This expert consensus highlights the need for robust data generation to overcome the limitations of surveys and literature-based studies.

Keywords: Obesity, Diabetes, Cardiorenal Disease, Cardiorenal Disease, Delphi Panel.

INTRODUCTION

Obesity has become a global pandemic, with increasing mortality and morbidity rates worldwide, especially in developed countries. Reliable datasets on comorbidity prevalence across countries and geographic regions are needed to implement preventive measures and to formulate health policies effectively. A multifaceted analysis of the data will guide policymakers in effectively utilising resources while addressing strategic needs to mitigate the burden of diabetes and obesity. [1]

The prevalence of diabetes is skyrocketing not only in Turkey but also around the globe. Approximately 590 million people are expected to have diabetes as of 2025. Turkey has the highest number of adults (ages 20-79) with diabetes and the highest diabetes prevalence among the 60 countries in the IDF

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European Region. The number of people with diabetes, estimated at 9.6 million in 2024, is expected to reach 14.1 million by 2050. Interestingly, while 11% of individuals in the adult population (20-79 years), or in other words, 1 in every nine adults, have diabetes, yet 4 in every 10 diabetic patients are unaware of their condition. [2]

Based on projections, 25% of the global population is estimated to be obese by 2035. Between 2020 and 2035, the increase in adult obesity in Turkey was 1.9%, more than double the rise in childhood obesity at 2.7%. Consequently, the proportion of adults with obesity is expected to reach 55% in 2035. [3]

Today, atherosclerotic cardiovascular disease, particularly coronary heart disease and ischemic stroke, is a leading cause of premature death worldwide. Cardiovascular disease affects children, adults, and both men and women. In Europe, 42% of all deaths before the age of 75 in women and 38% in men are due to cardiovascular causes. [4] Turkey is also among the high-risk countries for cardiovascular disease. Today, many countries have a high incidence of type 2 diabetes mellitus, which the long-established link between obesity, kidney diseases, and cardiovascular diseases can explain. Numerous high-risk obese individuals exhibit a clustering of metabolic (both diabetic and renal) and cardiovascular risk factors because obesity is frequently linked to hypertension and dyslipidemia. [5]

This study aimed to address the strategic need to understand the burden of diabetes, obesity, and cardiorenal diseases in Turkey. It also sought to compare different data sources on the prevalence of comorbidities, thereby creating a reliable dataset that can be shared with policymakers. A Delphi panel aimed to support decision-making processes aligned with national and regional health policies and to provide a solid analytical basis for articles to be published at the academic and institutional levels.

METHOD

Delphi Panel

The panel comprised an interdisciplinary group bringing together leading physicians from various fields in Turkey. Experienced experts in cardiology, endocrinology, internal medicine, and nephrology participated, providing a comprehensive overview of the burden of chronic diseases, particularly diabetes, obesity, cardiovascular disease, and kidney disease. The panel process, designed by a Professional third party (Ipsos), was structured to allow participants to showcase both their scientific and field experience, with careful attention paid to balancing scientific accuracy with practical application.

The Delphi Panel methodology is built on three pillars: (i) Data from the TÜİK 2022 Health Survey (29,000+ individuals, population over 18) presented self-reported diagnosis rates. (ii) Additional evidence was collected from national and international studies through a systematic literature review (PRISMA approach). (iii) Perceptual data based on field experience were obtained through an expert survey and a Delphi panel. A 24-question comparison table was created based on these three data sources, and the panel discussed and reached a consensus on the values that best reflect Türkiye's reality under each heading.

Systematic Review

A systematic literature search was conducted on PubMed, SCOPUS, COCHRANE Central Register of Controlled Trials, EMBASE, and TURKISH MEDLINE to identify original peer-reviewed articles until May 2025. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed. The keywords related to diabetes and its complications were included in the search strategy.

The study was divided into two stages. The first step involved analysing articles on diabetes, obesity, metabolic syndrome, and comorbid kidney diseases, cardiovascular diseases, and complications related to diabetes and obesity. The systematic review focused on the comorbidities of diabetes and obesity.

Inclusion Criteria

This systematic review analysed literature published in peer-reviewed English journals. It included randomised controlled trials (RCTs), controlled clinical trials, observational studies, and cohort studies.

Exclusion Criteria

Any non-human study, as well as cadaver studies, were excluded. Additionally, studies that did not report relevant outcomes, literature reviews, editorials, case-control studies, and those with insufficient methodological quality, as well as articles published in non-peer-reviewed journals, were excluded from the interpretation. Articles that did not provide detailed data on the epidemiology and/or prevalence of diabetes, obesity, and comorbid conditions were also excluded from evaluation. Studies not published in English and/or Turkish were all excluded.

Literature Search

The search utilised the following algorithm: “diabetes, obesity, metabolic syndrome, kidney diseases, cardiovascular diseases, comorbidities and complications.” The evidence level (LE) of each included trial was assessed. Following consensus on the final set of articles, two physicians independently evaluated the quality of each article using the Downs and Black checklist, which assesses both randomised and non-randomised trials. Additionally, the two writers reviewed the titles and abstracts of citations, obtained the full texts of potentially eligible studies, and identified any discrepancies. The reference lists of obtained papers were further examined for further qualifying publications.

Data Extraction And Outcomes

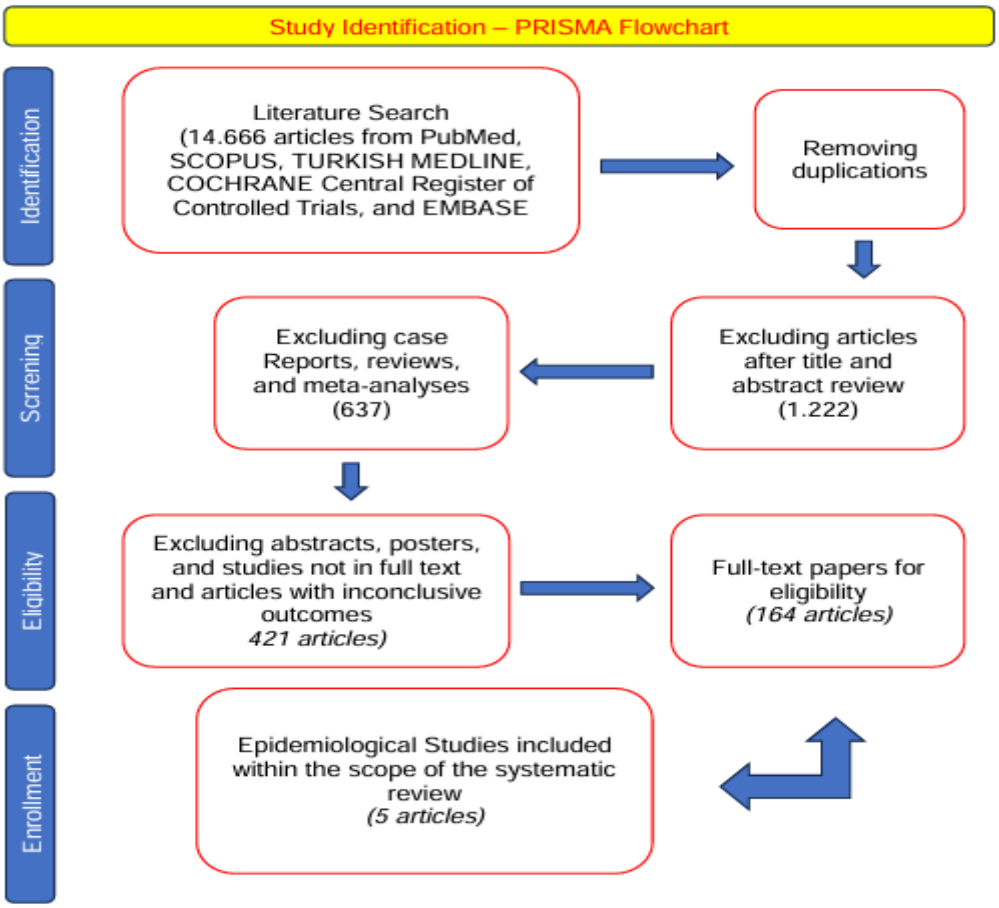

Figure 1. PRISMA Flowchart for article enrollment for the 1st step of the review.

The following information was recorded regarding each eligible study: author's name, journal of publication, year of publication, country of origin, study type, total number of patients, and patient demographics. The initial (first) step consisted of a desktop search with 14.666 articles. The second-step search yielded 1,222 studies, of which 637 were removed due to duplication. After this initial screening, 421 manuscripts were excluded as case reports, narrative reviews, or meta-analyses, leaving 164 articles. After excluding abstracts, posters, and studies without full text, five epidemiological studies were selected for the second step of this systematic review (Figure 1).

Whenever applicable, the required data were retrieved from the studies ultimately included by the author. Based on a predefined checklist worksheet, the worksheet is supervised by a professional consultancy for accuracy. If any data are missing or there is any doubt, the sponsor will be contacted via email, as poorly reported outcomes in the included materials could compromise the validity of our work. The following data were extracted: first author, year of publication, country of origin, study type, epidemiology, and prevalence and incidence of diabetes, obesity, comorbid kidney disease, comorbid cardiovascular disease, and metabolic syndrome.

RESULTS

The Turkish Statistical Institute (TÜIK) health status data rely on patient-reported outcomes (PROs), which were obtained from the perceptions of participating healthcare professionals. It was clarified that the phrase "Have you been diagnosed with diabetes in the last 12 months?" in the TÜİK (13%) data only covers individuals who have been diagnosed. Delphi panel participants stated that the burden of undiagnosed diabetes is high and that the diagnostic gap may be more pronounced in men. The high rate observed in clinical data (16.5%) is attributable to a selective population effect. [6] When examining the three data sources, consensus was reached that the PRO data (19%) most closely approximates clinical reality. It was noted that undiagnosed CVD or obesity could distort the classification of individuals with diabetes without comorbidities.

The panel emphasised that young/middle-aged individuals predominate in this group and have the potential for uncomplicated progression. The PRO data were selected as the source that best reflects the clinical distribution (TÜİK: 8%, literature: 8.2%, PRO: 9.1%). [7, 8] The definition of BMI ≥30 kg/m2 is self-reported in both TÜİK (42%) and PRO data (45%). Participants noted that obesity is particularly prevalent in type 2 diabetes, and that self-reported weight reporting may be underreported. This group was considered critical due to the high cardiometabolic risk. The PRO column was selected as the most realistic scenario. The panel discussed the scope of the definition of CVD; it was clarified that CVD includes included stroke, myocardial infarction, angina pectoris, heart failure, ischemic heart disease, cardiovascular disease, coronary heart disease, atherosclerosis, and cardiovascular death, excluding hypertension as it was classified as a risk factor. It was noted that a lack of diagnostic awareness is associated with lower TÜİK rates. PRO data were selected because they more closely reflect the clinical picture (TÜİK: 24%, literature: 32.2%, PRO: 30%). [7] It was noted that kidney disease is self-reported and lacks laboratory confirmation. It was shared that microalbuminuria should be included. PRO data were preferred because TÜİK data do not include cases that are undiagnosed at an early stage(TÜİK: 15%, literature: 37%, PRO: 29%) (Table 1). [8]

Table 1. Comparison of TÜİK statistics, literatüre data, and physician-reported outcomes on diabetes

Patients	TÜİK	Literature	PRO
Diyabetes	**13%**	**15.7%**	**19%**
Diabetes only	8%	8.2%	9.1%
Diabetes and comorbid obesity	42%	45%	45%
Diabetes and comorbid cardiovascular diseases	24%	32.2%	30%
Diabetes and comorbid kidney diseases	15%	37%	29%
Diabetes, comorbid obesity, and cardiovascular diseases	10%	20%	24%
Diabetes, comorbid obesity, and kidney disease	6%	15%	17.6%
Diabetes, comorbid obesity, cardiovascular and kidney disease	3%	7%	10.3%

**PRO: physician-reported outcomes.*

Obesity was defined as a BMI ≥30 kg/m2; overweight (BMI 25–29.9 kg/m2) was excluded. Due to the risk of bias in self-reported weight-height data, the PRO column (38%) was deemed consistent with the literature (36%). [9] It was noted that only individuals with a BMI ≥30 kg/m2 who were obese were predominantly young and at risk for metabolic syndrome. PRO data was selected because undiagnosed comorbidities could create bias (TÜİK: 25%, literature: 32%, PRO: 33.6%). [10] The definition of CVD was considered broad in practice (including hypertension). Given the potential underrepresentation of hypertension in TÜİK data due to the prevalence of hypertension among obese individuals and limited awareness, it was recommended to use PRO data as the basis (TÜİK: 13%, literature: 12,5%, PRO: 32.8%). [11] PRO figures were selected by consensus because the TÜİK data did not provide sufficient information on comorbid kidney diseases among obese individuals (TÜİK: 8%; PRO: 19.2%). PRO data were selected for all other obesity-related comorbidity data (Table 2).

Table 2. Comparison of TÜİK statistics, literatüre data, and physician-reported outcomes on obesity

	TÜİK	Literature	PRO
Obesiy	**22%**	**36%**	**38%**
Obesity only	3%	-	6.9%
Obesity and comorbid diabetes	25%	32%	33.6%
Obesity and comorbid cardiovascular diseases	13%	37,8%	32.8%
Obesity and comorbid kidney disease	8%	-	19.2%
Obesity and comorbid diabetes and cardiovascular disease	6%	-	20.4%
Obesity and comorbid diabetes and kidney disease	4%	-	11.5%
Obesity and comorbid diabetes, cardiovascular and kidney disease	2%	-	7%

**PRO: physician-reported outcomes.*

The scope of CVD should be evaluated considering the use of narrow and broad definitions across contexts, as well as the understanding of CVD in relation to comorbid hypertension (literature data: 37,8%). [12] PRO data was chosen due to the lack of awareness of hypertension in the TÜİK data. Individuals with CVD who do not have obesity, diabetes, or kidney disease are more likely to be elderly (TÜİK: 9%, PRO: 2.7%). PRO was selected as the data that best reflects this area. The risk of mortality is high in the scenario of CVD and diabetes coexistence, and this is commonly observed in clinical practice. PRO was selected as the data that best reflects this area (TÜİK: 36%, PRO: 40.7%) (Table 3).

Table 3. Comparison of TÜİK statistics, literatüre data, and physician-reported outcomes on cardiovascular diseases

	TÜİK	Literature	PRO
Cardiovascular Diseases	**8%**	**6%**	**10.9%**
Cardiovascular diseases only	9%	-	2.7%
Cardiovascular disease and comorbid diabetes	36%	-	40.7%
Cardiovascular disease and comorbid obesity	34%	M: 25.3%	38%
		F: 44.2%	
Cardiovascular disease and comorbid kidney disease	18%	-	24%
Cardiovascular disease, comorbid obesity, and diabetes	16%	-	24%
Cardiovascular disease, comorbid kidney disease, and obesity	7%	-	8.5%
Cardiovascular disease and comorbid kidney disease, obesity, and diabetes	4%	-	5.3%

**PRO: physician-reported outcomes, M: male, F: female.*

DISCUSSION

The World Health Organisation's European Regional Obesity Report (2022) identified Turkey as the country with the highest rates of overweight and obesity among European countries. The average overweight rate is 66.8%, compared to a European average of 58.7%. Obesity statistics indicate that the average prevalence in Türkiye is 32.1%, whereas in Europe it is 23.3%. In Turkey, 64% of males and 69.3% of females are classified as overweight, which is higher than the European averages of 62.9% for males and 54.3% for females. The obesity rates are 24.4% for males and 39.2% for females, higher than the European averages of 21.8% for males and 24.5% for females. [13 – 15]

One of the earliest population-based studies, the Turkish Diabetes Epidemiology Study (TURDEP-I), enrolled 24.788 individuals. Based on 2-hour blood glucose readings, glucose tolerance was categorised according to WHO guidelines. Impaired glucose tolerance (IGT) was 6.7% and the overall crude

prevalence of diabetes was 7.2% (previously undiagnosed, 2.3%). Diabetes was present in 6.2% of males and 8.0% of women (P <0.0001). Additionally, women were more likely than males to have IGT (P <0.0001). Although the frequency of IGT increased with age, the reverse was true for diabetes. Overall, 29% of people had hypertension, and 22% were obese. Women were more likely than men to have both (P <0.0001). Waist-to-hip ratio-based (WHR) central obesity prevalence (19%) was similar to BMI-based general obesity prevalence. The prevalence of central obesity was higher (34%) when measured by waist circumference. The comparatively low percentage of undiagnosed diabetes (32%), however, was an intriguing finding. [16] The percentages of diabetes and IGT in this survey, along with the rates of undiagnosed diabetes, were comparable to those from Italy and the United States (Third National Health and Nutrition Examination Survey) [17, 18].

The Turkish Epidemiology Survey of Diabetes, Hypertension, Obesity and Endocrine Disease (TURDEP-II) was carried out at the same study centres as TURDEP-I, twelve years after the initial survey. The population-based study included 26.499 randomly selected adults. After measuring fasting glucose, an OGTT was conducted to determine whether any eligible participants had diabetes or prediabetes. There were 6.5 million adults in Turkey who had diabetes, with the prevalence of the disease being 16.5% (new 7.5%). Compared to men, it was higher in women (p = 0.008). According to the 1997–1998 TURDEP-I population, the age-standardised prevalence was 13.7%; using the same diagnostic criteria, the prevalence of diabetes would be 11.4%. The prevalence of obesity was 36%, hypertension was 31.4%, and isolated-IFG, IGT, and combined prediabetes were 14.7%, 7.9%, and 8.2%, respectively. In contrast to TURDEP-I, the growth rates for diabetes, IGT, obesity, and central obesity were 90%, 106%, 40%, and 35%, respectively. However, over the past 12 years, hypertension has dropped by 11%. Waist, body mass index (BMI), hypertension, low education, and living situation were all independently linked to a higher incidence of diabetes in women. In contrast, BMI and hypertension were linked to a higher prevalence of diabetes in males. [19]

Of them, 45.5% had recently been diagnosed with diabetes (prevalence: 7.5% and 95% CI: 6.3–8.7) and 54.5% had previously been diagnosed with diabetes (9.0%; 7.8–10.1) (p<0.001). The crude prevalence of diabetes was 16.5% (95% CI: 16.1–17.0). Eighty-five percent of those with diabetes who had previously been diagnosed were taking anti-diabetic drugs (oral anti-diabetics - OAD: 71.9%, insulin: 2.2%, insulin + OAD: 11.4%). Prediabetes was crudely present in 30.8% of people (isolated-impaired fasting glucose - IFG 14.7%, isolated-IGT 7.9%, and combined 8.2%). Of the study participants, 36% were obese, 37% were overweight, 54% had central obesity, and 31% had hypertension. Women were more likely than men to have diabetes (17.2 %; 16.6–17.8) (p = 0.008). While there was no gender difference in isolated-IGG, women were more likely than men to have both isolated-IGT and combined prediabetes (p<0.001). [19]

The Prospective Urban Rural Epidemiology (PURE) project is a prospective cohort study that collected data on chronic diseases and social, environmental, and personal risk factors among people aged 35 to 70 residing in both rural and urban areas across 25 countries. The Population Health Research Institute at McMaster University in Canada oversees the PURE Project, and the Metabolic Syndrome Society is responsible for the study in Turkey. The primary objective was to investigate the effects of urbanisation on the development of cardiovascular diseases (CVD), as well as fundamental risk factors (physical activity and dietary changes), and primary risk factors (obesity, hypertension, dysglycemia, and dyslipidemia). The investigation is being carried out in eight cities in Turkey. In 2008, fieldwork began. Participants were contacted annually for follow-up. Field measurements, questionnaires, and biological data gathering were repeated every three years. [20]

The Turkish centres enrolled 4.056 participants in PURE Turkey. The prevalence of hypertension was 41.1%, and 66% of the hypertensive people were unable to control their blood pressure. It was shown that 63.3% of people were aware of hypertension. Of the participants, 46.6% of those in rural areas had a diagnosis of hypertension, and 39.6% of those in urban areas did. Of the participants, hypertension was present in 52% of the women and 48% of the men. The prevalence of diabetes was 13.7%. In urban regions, the prevalence was 15.8%, whereas in rural areas, it was 12.6%. While 75.1% of patients had

not achieved glycemic control, 25% had. Compared with 9.2% in rural areas and 9.6% in urban areas, 9.4% of respondents had prediabetes, and 87.4% reported being aware of diabetes. [20]

End-stage renal failure and comorbid cardiovascular problems were investigated in a population-based survey to determine the prevalence of chronic kidney disease and cardiovascular risk factors. The study included a total of 10.872 participants. The CREDIT Study [22] reported that 5.2% of participants assessed for glomerular filtration rate (GFR) had a low GFR (<60 mL/min/1.73 m2), and 10.2% and 2% of participants, respectively, had microalbuminuria and macroalbuminuria. The prevalence of chronic kidney disease was 15.7%, and it was greater in women than in males (18.4% vs. 12.8%, $P < 0.001$). Subjects with CKD had significantly higher rates of obesity (20.1%), dyslipidemia (76.3%), diabetes (12.7%), hypertension (32.7% in the general population), and metabolic syndrome (31.3%) than those without CKD ($P < 0.001$ for all). [21]

In 2006, Turkey launched Sağlık-NET, a national health information infrastructure, and in 2015, it launched e-Nabız, a national electronic health record system. The population covered by this electronic system is about 99.1%. Diabetes affected 7.178.674 persons in Turkey, representing an 11.12% prevalence. Among women aged 70–74, the highest proportion was 39.21%, and among men aged 75–79, it was 32.74%. In 2020, 310.663 individuals with diabetes had merely elevated fasting blood glucose (potentially undiagnosed patients), making up 4.3% of the total population with diabetes. The prevalence is 9.12% in men and 13.10% in women. The e-nabız data denoted a diabetes prevalence of 11% in Turkey. [22]

Turkey stands out as one of the countries with the highest prevalence of diabetes in the European region. The burden of obesity and future projections: Data from the WHO Europe report and the World Obesity Atlas 2025 are presented. The lifetime risk of having a BMI greater than 25 kg/m² among adults in Turkey is estimated to be 80–100% [13, 23].

The findings from the Delphi panel provide a crucial basis for a deeper understanding of the actual burden of diabetes, obesity, and related comorbidities in Turkey. Considering the limitations of self-reported data and the lack of diagnostic awareness, the panel reached consensus values consistent with clinical reality. This has enabled it to provide reliable and applicable evidence at both the policy level and in the academic literature. The lack of diagnostic awareness regarding the prevalence of diabetes and obesity is particularly evident in men and individuals without diagnosed hypertension. There are contextual differences between narrow (e.g., MI, CAD, HF) and broad (e.g., hypertension) approaches to defining cardiovascular disease; these differences should be considered in the formulation of health policy arguments. In kidney diseases, the inclusion of microalbuminuria and an eGFR threshold of <60 is essential to reflect the actual burden accurately.

CONCLUSION

The outcomes from the Delphi panel provided a crucial foundation for a better understanding of the true burden of diabetes, obesity, and cardiovascular and renal comorbidities in Turkey. While acknowledging the limitations of self-reported data and the lack of diagnostic awareness, the panel reached consensus on values consistent with clinical reality in the field. These findings highlight the tendency of existing studies to underestimate disease prevalence, necessitating expert panels to obtain accurate assessments that better inform national health needs. Integrating extensive datasets with expert insights can support targeted interventions to reduce the burden of obesity, diabetes, and cardiorenal diseases in Turkey, ultimately improving public health outcomes. This panel will leverage a reliable and applicable evidence at both the policy level and in the academic literature.

DESCRIPTIONS

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REFERENCES

1. Li MY, Luo YY, Zhang P, et al. Interpretation of national clinical practice guideline on obesity management (2024 edition). Zhonghua Yi Xue Za Zhi. 2025;105(18):1387-1391. doi:10.3760/cma.j.cn112137-20250221-00414

2. IDF Diabetes Atlas 2025, International Diabetes Federation, https://diabetesatlas.org/resources/idf-diabetes-atlas-2025/ [Accessed at 19 September 2025]

3. Obesity Atlas 2024, World Obesity Global Obesity Observatory, https://data.worldobesity.org/publications/?cat=22 [Accessed at 19.09.2025]

4. Perk J, De Backer G, Gohlke H, et al. European Guidelines on cardiovascular disease prevention in clinical practice (version 2012). The Fifth Joint Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention in Clinical Practice (constituted by representatives of nine societies and by invited experts). Eur Heart J. 2012;33(13):1635-1701. doi:10.1093/eurheartj/ehs092

5. Piché ME, Tchernof A, Després JP. Obesity Phenotypes, Diabetes, and Cardiovascular Diseases. Circ Res. 2020;126(11):1477-1500. doi:10.1161/CIRCRESAHA.120.316101

6. Diabetes Insights & Data for Türkiye | IDF Atlas.

7. Einarson TR, Acs A, Ludwig C, Panton UH. Prevalence of cardiovascular disease in type 2 diabetes: a systematic literature review of scientific evidence from across the world in 2007-2017. Cardiovasc Diabetol. 2018 Jun 8;17(1):83. doi: 10.1186/s12933-018-0728-6. PMID: 29884191; PMCID: PMC5994068.

8. Wu B, Bell K, Stanford A, Kern DM, Tunceli O, Vupputuri S, et al. Understanding CKD among patients with T2DM: prevalence, temporal trends, and treatment patterns—NHANES 2007–2012. BMJ Open Diabetes Research & Care. 2016;4:e000154. https://doi.org/10.1136/bmjdrc-2015-000154

9. The World Obesity Foundation. World Obesity Atlas 2025. https://s3-eu-west-1.amazonaws.com/wof-files/World_Obesity_Atlas_2025.pdf [Accessed at:14/03/2025)

10. Gogas Yavuz D, Akhtar O, Low K, et al. The Economic Impact of Obesity in Turkey: A Micro-Costing Analysis. Clinicoecon Outcomes Res. 2024;16:123-132. Published 2024 Mar 5. doi:10.2147/CEOR.S446560.

11. Civek S., Akman M. Frequency and risk Assessment of cardiovascular diseases in the world and Turkey. Jour Turk Fam Phy 2022; 13 (1): 21-28. Doi: 10.15511/tjtfp.22.00121.

12. Arici M, Turgan C, Altun B, et al. Hypertension incidence in Turkey (HinT): a population-based study. J Hypertens. 2010;28(2):240-244. doi:10.1097/HJH.0b013e328332c36b

13. Ilić M, Pang H, Vlaški T, Grujičić M, Novaković B. Prevalence and associated factors of overweight and obesity among medical students from the Western Balkans (South-East Europe Region). BMC Public Health. 2024;24(1):29. Published 2024 Jan 2. doi:10.1186/s12889-023-17389-7

14. Yilmaz ES, Malhan S, Gurser B, Gogas Yavuz D. The Impact of Obesity-Related Complications on Healthcare Costs - Outcomes of a Pharmacoeconomic Weight Loss Model. Clinicoecon Outcomes Res. 2025;17:277-287. Published 2025 Apr 5. doi:10.2147/CEOR.S500142

15. World Health Organisation. WHO European Regional Obesity Report 2022. 2022 [cited 2022 Nov 8]; Available from: https://apps.who.int/iris/handle/10665/353747 Accessed September 10, 2025.

16. Satman I, Yilmaz T, Sengül A, et al. Population-based study of diabetes and risk characteristics in Turkey: results of the turkish diabetes epidemiology study (TURDEP). Diabetes Care. 2002;25(9):1551-1556. doi:10.2337/diacare.25.9.1551

17. Harris MI, Flegal KM, Cowie CC, et al. Prevalence of diabetes, impaired fasting glucose, and impaired glucose tolerance in U.S. adults. The Third National Health and Nutrition Examination Survey, 1988-1994. Diabetes Care. 1998;21(4):518-524. doi:10.2337/diacare.21.4.518

18. Garancini MP, Calori G, Ruotolo G, et al. Prevalence of NIDDM and impaired glucose tolerance in Italy: an OGTT-based population study. Diabetologia. 1995;38(3):306-313. doi:10.1007/BF00400635

19. Satman, Ilhan & Tutuncu, Yildiz & Gedik, S. (2011). The TURDEP-II Study Group, Diabetes epidemic in Turkey: results of the second population based survey of diabetes and risk characteristics in Turkey (TURDEP-II). Diabetologia. 54

20. Oğuz A, Telci Çaklılı Ö, Tümerdem Çalık B; PURE Investigators. The Prospective Urban Rural Epidemiology (PURE) study: PURE Turkey. Turk Kardiyol Dern Ars. 2018;46(7):613-623. doi:10.5543/tkda.2018.32967

21. Süleymanlar G, Utaş C, Arinsoy T, et al. A population-based survey of Chronic REnal Disease In Turkey--the CREDIT study. Nephrol Dial Transplant. 2011;26(6):1862-1871. doi:10.1093/ndt/gfq656

22. Ülgü MM, Gülkesen KH, Akünal A, et al. Characteristics of diabetes mellitus patients in Turkey: An analysis of national electronic health records. Turk J Med Sci. 2023;53(1):316-322. doi:10.55730/1300-0144.5587

23. Sandalcı U, Tuncer G. An evaluation of direct and indirect costs of obesity. 2020:29–44. Available from: http://aksarayiibd.aksaray.edu.tr/tr/download/article-file/1152210. Accessed September 10, 2025.