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A Systematic Review of the Burden of Disease Studies on Diabetes

Selin COŞKUN[1]
Vahit YİĞİT[2]

ABSTRACT

Diabetes is a major cause of morbidity and premature mortality on a global scale, and its prevalence has been increasing in recent decades. The overall health impact of the disease is measured by disability-adjusted life years (DALYs), which is the sum of years of life lost due to disability (YLDs) and years of life lost due to premature death (YLLs). This systematic review was conducted to evaluate studies that estimated the burden of diabetes at the global, national, or regional level, and to identify and review the epidemiological metrics (DALYs, YLDs, YLLs, incidence, prevalence, and mortality) and the methods used to determine the burden of disease. A comprehensive search strategy was employed to identify eligible studies published between January 1, 2000, and December 31, 2024, in MEDLINE, Scopus, ScienceDirect, BioMed Central and CINAHL databases. The study was conducted in accordance with the PRISMA 2020 guidelines. Studies that utilized DALYs or their subsets (YLDs/YLLs) as measures of the health impact of diabetes and that were published in English were included in the review. Following a thorough evaluation of the relevant literature, a total of 16 studies out of 1,307 were deemed to be eligible for review. This research reveals a lack of harmonization of epidemiological data and methods that hinder the capacity for meaningful comparisons across studies of the burden of diabetes. The findings

1 Süleyman Demirel University, Faculty of Economics and Administrative Sciences, Isparta, Türkiye
2 Süleyman Demirel University, Faculty of Economics and Administrative Sciences, Isparta, Türkiye
* Corresponding author: Selin COŞKUN, selinc716@gmail.com

outlined in this study provide a comprehensive framework for the diversification of diabetes burden of disease studies across different countries and regions, with a particular focus on the global level.

Keywords: Diabetes Mellitus, Disability-Adjusted Life Years, Global Burden of Disease, Systematic Review

INTRODUCTION

Diabetes is among the foremost causes of death and disability on a global scale, affecting individuals irrespective of their geographical location, gender, or age group. The prevalence of diabetes is increasing at a consistent rate, representing a substantial threat to public health. Concurrently, diabetes was designated as one of the five priority non-communicable diseases targeted in the 2011 Political Declaration on the Prevention and Control of Non-Communicable Diseases. In 2021, it was estimated that approximately 537 million people worldwide had diabetes. The 10th edition of the International Diabetes Federation Atlas corroborates the notion that diabetes is an epidemic and one of the fastest-growing global health emergencies of the twenty-first century, with projections of 1.3 billion cases by 2050 (Abbafati et al., 2024; Armocida et al., 2024). These figures underscore the pressing need to address the escalating prevalence of diabetes. Lifestyle diseases, including diabetes, are undoubtedly a growing problem of our time, both locally and globally (Kotwas et al., 2021).

The Global Burden of Disease Study (GBD) uses four main indicators to calculate the burden of disease: mortality, life years lost due to premature death (YLLs), life years lived with disability (YLDs), and disability-adjusted life years (DALYs), which is the sum of the last two (Duncan et al., 2020). DALYs were first introduced by Murray in 1994 (Oliveira et al., 2024). DALY is a population health metric that measures the disease burden of a population by combining mortality in YLL and morbidity in YLD. This important global effort utilizes a health metric to estimate fatal and non-fatal health outcomes, allowing the impact of different diseases, injuries, and risk factors to be compared over time and across geographies. Consequently, the DALY concept offers a holistic perspective on health and serves as a valuable tool for informing decisions on disease prevention (Charalampous et al., 2022).

Studies estimating DALYs for diabetes have the capacity to provide insight into the epidemiological data sources and methodological approaches used to assess the

burden of the disease. The primary objective of this systematic review is to provide a comprehensive overview of studies that estimate the burden of diabetes using DALY, YLD, and YLL metrics. Secondary objectives include the identification of epidemiological measures (e.g. incidence, prevalence, mortality) and the evaluation of methodological approaches employed across global, national, and regional studies.

METHODOLOGY

The present study was conducted by searching online databases in December 2024, in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Page et al., 2021).

Search Strategy and Data Sources

The objective of this systematic review was to identify research articles that focused on the disease burden of diabetes. A comprehensive search strategy was employed across five databases (i.e., MEDLINE, Scopus, ScienceDirect, BioMed Central, and CINAHL) to identify diabetes disease burden studies published between 1 January 2000 and 31 December 2024. The search terms and numbers utilized are delineated in Table 1.

Table 1: Search terms used in databases

Database	Search Terms	Number of Articles
MEDLINE	(Disability-Adjusted Life Years OR (DALY OR DALYs) OR YLL OR YLLs AND (MH "Diabetes mellitus diseases OR diabetes type 1 diabetes OR type 2 diabetes"))	404
Scopus	(TITLE-ABS-KEY("disability-adjusted life year") OR TITLE-ABS-KEY("years of life lost") OR TITLE-ABS-KEY(daly OR dalys OR (disabil*) near/4 (adjust*) near/4 (life*) near/4 (year*)) OR TITLE-ABS-KEY(yll) OR TITLE-ABS-KEY(ylls) OR TITLE-ABS-KEY((year*) next/2 (life*) next/1 (lost*)) OR TITLE-ABS-KEY(yld OR ylds) OR TITLE-ABS-KEY((year*) near/3 (lived) near/3 (disabil*)) AND TITLE-ABS-KEY(("diabetes mellitus" OR "diabetes" OR "diabet" OR "Type 1 diabetes" OR "Type 2 diabetes"))) AND PUBYEAR > 1999 AND PUBYEAR < 2025 AND (LIMIT-TO (LANGUAGE, "English")) AND (LIMIT-TO (SRCTYPE,"j")) AND (LIMIT-TO (DOCTYPE,"ar"))	721
ScienceDirect	"Disability-adjusted life years" OR "DALY" OR "DALYs" AND ("diabetes mellitus" OR "diabetes" OR "type 1 diabetes OR type 2 diabetes"))	162
BioMed Central	TI "Disability-Adjusted Life Years" OR TI "DALY" AND TI "Diabetes Mellitus" OR "Type 1 Diabetes OR Type 2 Diabetes"	14
CINAHL	TI "Disability-Adjusted Life Years" OR "DALY" AND TI ("Diabetes Mellitus" OR "Type 1 diabetes OR Type 2 diabetes")	6

The Mendeley Reference Manager (2.77.0) tool was utilized to organize the data, avoid duplication, and identify studies containing relevant keywords. A total of 1,307 studies satisfied the predetermined eligibility criteria and were incorporated into the search strategy. Concurrently, research sources were methodically categorized according to their respective subjects and significance.

Eligibility Criteria

This systematic literature review included studies that assessed the disease burden of diabetes using YLD and YLL as defined in the DALY and/or DALY framework. The review was restricted to studies that directly assessed the disease burden of diabetes. It is important to note that studies assessing the burden of diseases associated with risk factors of diabetes were excluded from the analysis. This is due to the fact that the definition of diabetes varies over time and geography. Moreover, conference abstracts, proceedings, editorials, and letters were excluded from the study. Despite the absence of geographical limitations in the study, the inclusion criteria were confined to research articles published in English. The inclusion and exclusion criteria are presented in Table 2.

Table 2: Inclusion and exclusion criteria

Inclusion Criteria	Exclusion Criteria
Studies using DALYs metrics	Studies not using DALYs measures Studies assessing the burden of disease related to risk factors of diabetes
Full-text research articles	Publications other than full-text research articles • Conference abstracts, • Proceedings paper, • Letters, • Editorials
Full-text research articles published between January 1, 2000-December 31, 2024	Studies published before January 1, 2000 and after December 31, 2024
Studies published in English language	Non-English language publications

Data Extraction

The present study incorporated research papers that adopted a burden of disease approach and evaluated DALYs for diabetes. The selection of studies and extraction of data were conducted by one researcher, with the validation of data elements performed by a second researcher. All studies from the databases that were included in the analysis were transferred to Mendeley (2.77.0). A thorough review of all transferred articles was conducted by two independent reviewers. The resolution of disagreements pertaining to inclusion and exclusion was attempted through the utilisation of a consensus-driven approach amongst the reviewers. A preliminary evaluation of the relevant studies was conducted on the basis of title and abstract, after which a selection was made for further analysis of the full texts. These were then subjected to a rigorous review by analysts, who were tasked with determining their conformity with the aforementioned selection criteria. Following the initial eligibility process, the studies were subjected to a more thorough investigation through a full-text review. Those that failed to satisfy the predetermined criteria were subsequently excluded from the analysis.

The study data were then subjected to analysis according to author, year, study objectives, type of diabetes, reference time period, geographical coverage (country), data source, reported metrics (DALY, YLD, YLL, incidence, prevalence, mortality), and program used. The articles that met the inclusion criteria were then organized in Microsoft Excel. Eligibility assessments were conducted in accordance with the inclusion and exclusion criteria established for each study.

RESULTS

Figure 1 presents the search flow chart of available burden of disease studies and an overview of the search and screening strategy performed in the literature review, including the main reasons for exclusion. Initially, a total of 1,307 studies were identified from the following databases: MEDLINE (n=404), Scopus (n=721), ScienceDirect (n=162), BioMed Central (n=14), and CINAHL (n=6). Following the removal of 208 duplicates, a total of 1,099 studies were retrieved for title abstract search in the Mendeley database. Following the removal of 836 studies upon title and abstract screening, 125 studies were subjected to a further evaluation process to ascertain their eligibility. Following a comprehensive review of the extant literature, a total of 16 eligible studies were included in the present research.

The PRISMA flow diagram showing the research inclusion process and reasons for exclusion is presented in Figure 1.

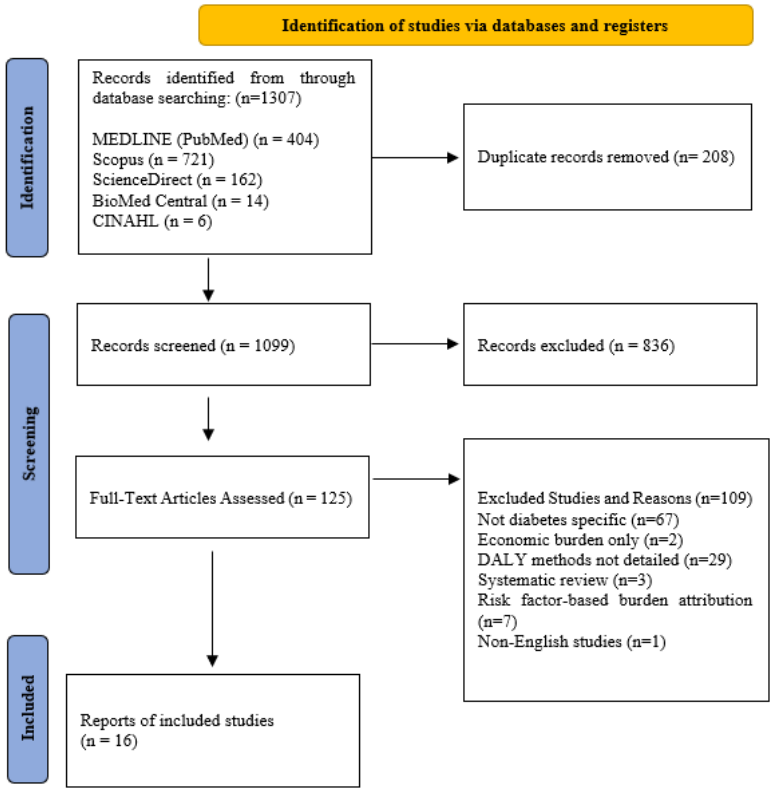

Figure 1. PRISMA flow chart for study selection

Study Characteristics

The objective of all studies included in the review was to assess or estimate the impact, burden and outcome of diabetes (see Table 3), and DALYs were utilized as a measure of diabetes disease burden. DALYs were expressed as years lost per 100,000 population. Of the 16 studies ultimately identified, five (Kotwas et al., 2021; Luo et al., 2024; Sun et al., 2023; Yang et al., 2024; Zhu et al., 2022) encompassed global coverage, while the remaining studies were conducted in the Western Pacific (Cao et al., 2023), North Africa and the Middle East (Esmaeili et al., 2022), and Latin America (Ilic & Ilic, 2024). A total of eight studies (Bandarian et al., 2023; Bener et al., 2014; Dávila-Cervantes, 2023; Oliveira et al., 2009; Gonzalez et al., 2014; Islam et al., 2023; Liu et al., 2023;

Pandey et al., 2022) assessed the effects of diabetes disease burden in a single country (Iran, Qatar, Mexico, Brazil, Argentina, Australia, China, and Nepal).

Table 3: An overview of diabetes burden of disease studies

Authors, Year	The Studies' Aims and Objectives	Type	Reference Time Period	Geographic Coverage	Data Source	Reported Metric(s)	Used Analysis Methods
(Bandarian et al., 2023)	'Estimating the burden of T1 DM in Iran over the last 30 years by sex, age, year, and state'	T1DM	1990-2019	Iran (31 states)	GBD 2019	DALYs, YLDs, YLLs, Incidence, Prevalence, Mortality	Stata version 13/R version 3.5.0
(Bener et al., 2014)	'To quantify the burden of disease in terms of deaths and DALYs due to DM in the State of Qatar'	DM	2007-2011	Qatar	ICD-10 mortality data (2013)/ Life tables (2007)/ Health records/ Databases/ Surveys	DALYs, YLDs, YLLs, Incidence, Prevalence, Mortality	Not reported
(Cao et al., 2023)	'To identify DM regional burden, trends, and inequalities in the Western Pacific region'	DM	1990-2019	West Pacific	GBD 2019	DALYs, Incidence, Prevalence, Mortality	GraphPad Prism (8.0), R software (1106), Joinpoint Regression 4.9.0.0
(Dávilla-Cervantes, 2023)	'Analysing the findings of the T2DM GBD-2019 study in adolescents and young adults'	T2DM	1990-2019	Mexican	GBD 2019	DALYs, YLDs, YLLs	Joinpoint Regression 4.8.0.1
(Oliveira et al., 2009)	'Presenting disease burden results in Brazil with emphasis on DM and its complications'	DM	1998	Brazil	ICD-10/ National Death Information System/SIM/ SUS/	DALYs, YLLs, YLDs, Mortality	Not reported
(Esmaeili et al., 2022)	'Reporting the burden of T1DM in the North Africa and MENA region and 21 countries'	T1DM	1990-2020	North Africa and MENA	GBD 2019	DALYs, YLDs, YLLs, Incidence, Prevalence	R software (version 3.6.1)

(Gonzalez et al., 2014)	'Measuring the economic burden of DM in Argentina by age, sex and region, in DALYs'	DM	2005	Argentina	Victorian Burden of Disease study, Office for National Statistics (2005), QUALIDIAB records, IDMPS study, Muray and Lopez 1996	DALYs, YLLs, YLDs	Not reported
(Ilic & Ilic, 2024)	'Assessing the burden of T2DM in Latin America'	T2DM	1990-2019	Latin America	GBD 2019	DALYs, Incidence, Mortality, YLDs, YLLs	Joinpoint software 4.9.0.0, SPSS software 20.0
(Islam et al., 2023)	'Comparing T2DM morbidity and mortality trends with countries with similar SDI'	T2DM	1990-2019	Australia	GBD 2019	DALYs, Prevalence, YLLs, YLDs, Mortality	Not reported
(Kotwas et al., 2021)	'Analysing selected epidemiological factors for T2DM'	T2DM	2000-2019	Poland, CE and Global	GBD 2019	DALYs, YLLs, YLDs	Not reported
(Liu et al., 2024)	'To comprehensively examine the temporal trend of DM DALYs from a global perspective'	DM	1990-2019	China	GBD 2019	DALYs, Incidence, Prevalence, Mortality	R v3.5.1
(Luo et al., 2024)	'Assessing the burden of T2DM in adolescents (15-24 years)'	T2DM	1990-2019	Global	GBD 2019	DALYs, Incidence	R software (version 4.1.1)
(Pandey et al., 2022)	'To present the burden of DM in terms of prevalence, mortality, and DALY'	DM	1990-2019	Nepal	GBD 2019	DALYs, Prevalence, Mortality	Not reported
(Sun et al., 2023)	'To assess DM globally and by different subgroups and to estimate the future burden of disease'	DM	1990-2019	Global	GBD 2019	DALYs, Incidence, Prevalence, Mortality	R 4.0.2, Microsoft Office Excel 2019, IBM SPSS 20.0

(Yang et al., 2024)	'To estimate the burden, trends, and inequalities of T1DM in older adults at global, regional, and national levels'	T1DM	1990-2019	Global	GBD 2019	DALYs, Prevalence, Mortality	GraphPad Prism 8.0, Joinpoint Regression program 5.0.2, and R 4.2.3
(Zhu et al., 2022)	'Examining descriptive epidemiology and trends in the burden of T2DM'	T2DM	1990-2019	Global	GBD 2019	DALYs, Incidence, Mortality	R software (version 3.5.1)

Abbreviations: DM, diabetes mellitus; T1DM, type 1 diabetes mellitus; T2DM, type 2 diabetes mellitus; DALYs, disability-adjusted life years; YLDs, years lived with disability; YLLs, years of life lost; GBD, Global Burden of Disease; MENA, Middle East and North Africa; CE, Central Europe.

Three of the studies (Bener et al., 2014; Gonzalez et al., 2014; Oliveira et al., 2009) estimated the burden of disease by calculating their own DALYs, YLDs, or YLLs, while 13 were secondary analyses using GBD 2019 results. In the context of the present study, a comprehensive review of the extant literature reveals those nine of the sixteen studies (Bandarian et al., 2023; Bener et al., 2014; Dávilla-Cervantes, 2023; Esmaeili et al., 2022; Gonzalez et al., 2014; Ilic & Ilic, 2024; Islam et al., 2023; Kotwas et al., 2021; Oliveira et al., 2009). In three studies (Cao et al., 2023; Liu et al., 2024; Sun et al., 2023) combined DALY (disability-adjusted life year) metrics, whilst three further studies (Cao et al., 2023; Liu et al., 2024; Sun et al., 2023) combined DALY with incidence, prevalence, and mortality data. Two of the remaining four studies (Pandey et al., 2022; Yang et al., 2024) utilized DALY, prevalence, and mortality data, one study (Zhu et al., 2022) incorporated DALY and incidence and mortality data, and the final study (Luo et al., 2024) encompassed solely DALY and incidence data.

The time intervals illustrated in Figure 2 denote the years in which the included studies were published. The highest number of studies was documented in 2023 (Bandarian et al., 2023; Cao et al., 2023; Dávilla-Cervantes, 2023; Islam et al., 2023; Sun et al., 2023).

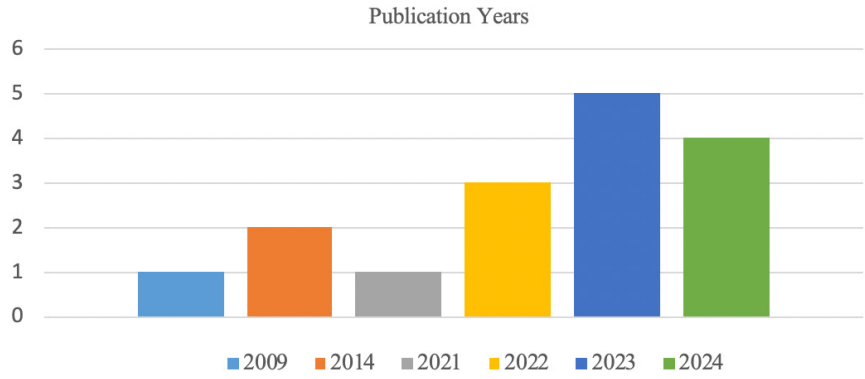

Figure 2. Years of publication of diabetes burden of disease studies

The time intervals illustrated in Figure 2 denote the years in which the included studies were published. The highest number of studies was documented in 2023 (Bandarian et al., 2023; Cao et al., 2023; Dávilla-Cervantes, 2023; Islam et al., 2023; Sun et al., 2023). In 2024, four studies were published (Ilic & Ilic, 2024; Liu et al., 2024; Luo et al., 2024; Yang et al., 2024). In 2022, three studies were published (Esmaelili et al., 2022; Pandey et al., 2022; Zhu et al., 2022). Additionally, one study was published in 2021 (Kotwas et al., 2021), two in 2014 (Bener et al., 2014; Gonzalez et al., 2014), and one in 2009 (Oliveira et al., 2009).

The findings related to author, year, age, weighting, morbidity, mortality, and DALY data from the included studies according to the search criteria are presented in Table 4.

Table 4: Evaluation results of diabetes burden studies

Authors, Year	Age Weighting	Morbidity			Mortality		DALYs (UI 95%)	DALYs Change Rate
		YLDs (UI 95%)	Prevalence	Incidence	Mortality	YLLs		
(Bandarian et al., 2023)	✓	28.2	388.9	11	0.7	23.5	51.7	4.7%
(Bener et al., 2014)	-	3.57	-	-	-	0.79	4.35	-
(Cao et al., 2023)	✓	-	T1DM=146.5 T2DM=4583.5	T1DM=3.8 T2DM=207.3	T1DM=0.4 T2DM=10.4	-	T1DM=27.4 T2DM=526.7	-
(Dávilla-Cervantes, 2023)	✓	195.44	-	-	2.47	168.0	342.88	31.29%
(Oliveira et al., 2009)	-	72.5	-	-	0.3	27.5	5.1	29.6%
(Esmaeili et al., 2022)	✓	26.6	378.5	10.6	1.2	37.4	64	71.6%
(Gonzalez et al., 2014)	✓	693.244	-	-	39.751	101.116	794.360	-
(Ilic & Ilic, 2024)	✓	559.2	-	313.0	29.9	610.0	1169.2	0.2%
(Islam et al., 2023)	✓	284.3	3429.9	-	8.9	140.4	424.8	17.0%
(Kotwas et al., 2021)	✓	GL: 423.72 CE: 513.46 PL: 516.33	-	-	-	GL:377.8CE:216.77 PL:191.89	GL:801.5CE:730.22 PL:708.22	GL:16.3% CE:24.7% PL:32.6%
(Liu et al., 2024)	✓	-	GL:8.827 China: 8.170	GL:416 China: 329	GL:30 China:15	-	GL:8.572.039 China:2.498.315	GL:20.3% China:43.7%
(Luo et al., 2024)	✓	-	-	108.36	-	-	49.20	2.01%
(Pandey et al., 2022)	✓	-	5.735.58	-	19.57	-	348	-
(Sun et al., 2023)	✓	-	5.555.39	267.54	19.47	-	858.96	0.71%
(Yang et al., 2024)	✓	-	514	-	3.54	-	103	- 33%
(Zhu et al., 2022)	✓	-	-	259.94	18.49	-	801.55	1.43%

An examination of Table 4 in the study by Bandarian et al. (2023) reveals an investigation into T1DM on a provincial basis in Iran. The study reported an increase in the average annual trend of age-standardised DALYs of 4.7% (95% CI - 11.2 to -23.3) between 1990 and 2019. Esmaeili et al. (2022) also examined the burden of T1DM disease in the North African and Middle Eastern region. The present study concluded that the age-standardised DALY rate increased by 71.6% (95% CI 43.9 to 99.9) over the last 30 years. The highest level of DALY annual rate of change was identified in the study by Esmaeili et al. (2022). A further study that examined T1DM was conducted by Yang et al. (2024). This study focused on the global population aged 65 years and over, and it was found that there was a decrease in the age-standardized DALY rate by -33% (95% CI -0.41% to -0.25%).

In the T2DM burden study conducted by Dávilla-Cervantes (2023) on adolescents and young adults, it was found that the age-standardized DALY rate increased by 31.29% (95% CI 17.52 to 48.75) between 1990 and 2019. In the study conducted by Ilic and Ilic (2024), the DALY rate due to T2DM in Latin America from 1990 to 2019 demonstrated a significant increasing trend (0.2% [95% CI 0.2 to 0.3]). In their study on the burden of T2DM in Australia, Islam et al. (2023) found that age-standardized DALYs increased by 17.0% (95% CI 5.0% to 29.9%). Zhu et al. (2022) found that the DALY rate increased by 1.43% (1.28 to 1.58) in the type 2 diabetes burden study conducted on the global population. Luo et al. (2024) found that from 1990 to 2019, the age-standardized DALY rate of T2DM in adolescents showed an increasing trend of 2.01%. In their seminal study, Kotwas et al. (2021) examined the burden of T2DM in Poland, Central Europe, and globally. Their findings revealed a significant increase in the age-standardized DALY rate, with increases of 16.37% on a global scale, 24.73% in Central Europe, and 32.65% in Poland.

The study conducted by Liu et al. (2024) on individuals with DM aged ≥ 20 years in China and globally found the highest age-standardized DALY rate to be 2.498.315. Consequently, the contribution of aging to diabetes DALYs was found to be significantly higher in China (43.7%) compared to the global average (20.3%). Sun et al. (2023), demonstrated that the global burden of disease attributable to diabetes has exhibited a marked upward trajectory since 1990, with an observed increase of 0.71% (95% CI 0.67 to 0.75). In the diabetes burden of disease study conducted by Oliveira et al. (2009), it was stated that there will be an increase of 29.6% in 15 years (1998-2013).

DISCUSSION AND CONCLUSIONS

This systematic review provides a comprehensive synthesis of studies that assess the burden of diabetes in terms of DALYs. Notably, 13 out of the 16 studies included relied on secondary analyses of GBD data, which highlights the dominance of the GBD framework as the primary source for global and national burden estimations. Using standardized GBD data across most of the studies included ensures methodological consistency and enables meaningful comparisons of the burden of diabetes across countries and over time. This review provides an overview of studies that have utilized and estimated DALYs

from diabetes as a health impact assessment technique. The objective of this study was to identify studies that examined the global, national, and regional burden of diabetes disease, and to identify the epidemiological measures (DALYs, YLD, YLL, incidence, prevalence, and mortality) and methods used. Following a comprehensive analysis of 1,307 studies, 16 studies were deemed to meet the established eligibility criteria. The DALY metric was expressed as years lost per 100,000 population. Seven of these studies evaluated the effects of a single country. Five of the studies were analyzed in a global dimension. In the studies conducted in China and Poland, both national and global impacts were analyzed and compared. Other studies were carried out across regions, including the Western Pacific, North Africa and the Middle East, and Latin America.

Seven studies addressed diabetes in general, while the remaining six studies addressed type 2 diabetes and three studies addressed type 1 diabetes exclusively. As a reference time frame, 12 studies made a 30-year estimate between 1990 and 2019. Of the 16 studies, nine employed DALY, YLD, and YLL metrics in conjunction, three utilized DALY with incidence, prevalence, and mortality data, two employed DALY, prevalence, and mortality data, one employed DALY with incidence and mortality data, and one employed solely DALY and incidence data. The analysis program utilized was predominantly R and Jointpoint Regression methods, while six studies did not specify the method employed. An evaluation of the study's results across different regions has revealed significant variations. For instance, while Esmaeili et al. (2022) reported a 71.6% increase in the type 1 diabetes burden in North Africa and the Middle East, Yang et al. (2024) noted a 33% decrease in DALY rates among older adults, suggesting improvements in disease management for this age group. In a similar fashion, Latin America (Ilic & Ilic, 2024) and Australia (Islam et al., 2023) exhibited rising trends, albeit at differing rates. The nation of China (Liu et al., 2024) bore the greatest DALY burden in general, primarily as a consequence of its aging population.

The observed variation in DALY trends across countries and diabetes types reflects differences in health system performance, demographic transitions, prevalence of risk factors, and methodological choices in burden estimation. For instance, the considerable rise in type 1 diabetes DALYs in North Africa and the Middle East stands in stark contrast to the declining trends observed

among older adults worldwide. This finding indicates the presence of regional disparities in disease control and access to healthcare services. These findings are consistent with systematic reviews of disease burden in other domains, such as cardiovascular diseases and chronic non-communicable rare diseases, which also report substantial heterogeneity in burden estimates despite similar methodologies (Charalampous et al., 2022; Oliveira et al., 2024).

Three of the included studies estimated the disease burden by directly calculating DALYs, YLLs, or YLDs using their own national data and methodologies. For instance, Dávilla-Cervantes (2023) conducted an age-specific burden analysis among adolescents and young adults in Mexico, revealing a 31.3% increase in DALY rate for type 2 diabetes in this demographic. Conversely, 13 studies utilized secondary analysis of GBD 2019 data. The extensive utilization of GBD estimates, as evidenced in Liu et al. (2024) for China and Ilic & Ilic (2024) for Latin America, confers the benefit of methodological standardization and facilitates valid comparisons across nations and over time. However, it also underscores a growing reliance on modelled data. Furthermore, in numerous GBD-based studies, including Islam et al. (2023), the analytical methods and statistical programs employed were not explicitly delineated, impeding transparency and reproducibility. It is imperative to articulate the methodologies employed to ensure transparency, comparability, and interpretability of future study outcomes. This study also underscores the absence of harmonization of epidemiological data and methods, which hinders the capacity for meaningful comparisons between studies of diabetes. It is recommended that studies be conducted in a range of countries and regions, particularly for global analysis.

Research into the epidemiological aspects of diabetes, which determine the burden of the disease and its impact on the healthcare system, helps policymakers and healthcare providers to determine their priorities for action and resource allocation. Consequently, this research is considered significant in terms of providing information on diabetes burden studies. The generation of further DALY study estimates could raise awareness of the necessity for research into diabetes and the allocation of social support funding, thereby reducing the burden of diabetes and inequalities. In this context, it is recommended that further high-quality studies be conducted, such as meta-analyses on the burden of diabetes.

Strengths and Limitations

To the best of our knowledge, this is the first systematic review to focus exclusively on the disease burden of diabetes using DALY, YLD, and YLL metrics. The use of standardised GBD data and adherence to PRISMA guidelines enhance comparability, transparency, and reproducibility. This review has several limitations. Only English-language studies were included, which may introduce language bias. Furthermore, the search was limited to specific databases (MEDLINE, Scopus, ScienceDirect, BioMed Central, and EBSCO). Lastly, methodological variations across studies, such as differences in data sources and DALY calculation methods, may limit the direct comparability of the findings.

Ethical Approval: Authors declare that the study presented in the manuscript entitled "A systematic review of the burden of disease studies on diabetes" does not require ethical approval.

Authors' Contributions: Coşkun, Selin: Conceptualization, Methodology, Data analysis, Writing – original draft, Writing – review & editing, Visualization. Yiğit, Vahit: Methodology, Validation, Supervision, Writing – review & editing.

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