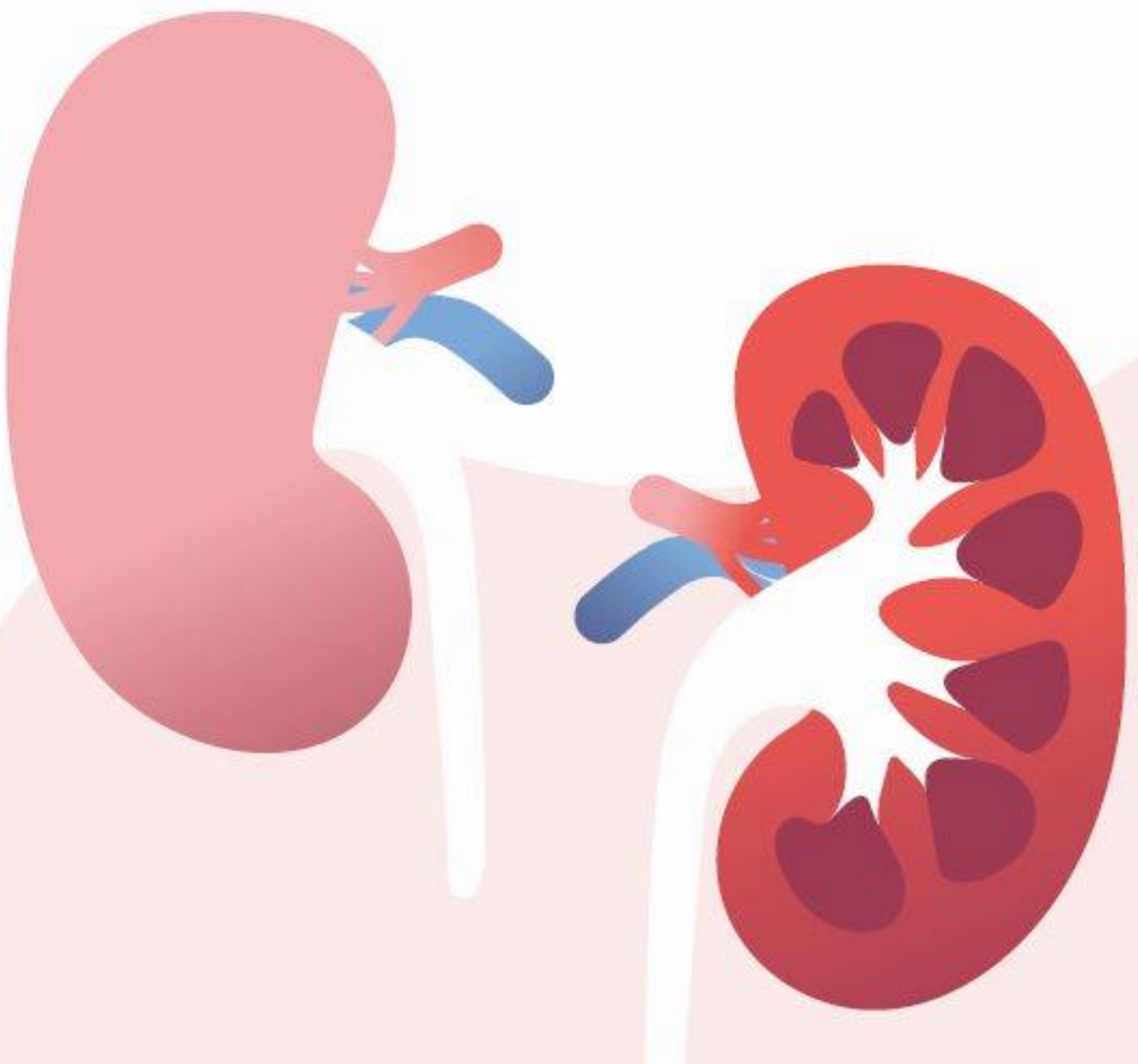


**Facts and Figures
about Chronic Kidney Disease
in the Netherlands
2024**



Preface

The report presents facts and figures about several indicators of the burden of chronic kidney disease in the Netherlands.

With the expected rise in risk factors such as diabetes, hypertension, overweight and the aging population, more and more people will experience negative consequences of chronic kidney disease in the coming years. Unfortunately, awareness about chronic kidney disease remains low, including in the Netherlands.









The Dutch Kidney Foundation initiated an effort to systemically report the burden of chronic kidney disease in the Netherlands to assess its consequences and to improve awareness about the disease.

This first report presents figures on the prevalence and incidence of chronic kidney disease in people 18 years and older registered in primary care in the Netherlands. The report also presents the prevalence of common comorbidities, their treatment, and the rate of death in those who are known to have chronic kidney disease. This report will be updated regularly, and more data will be added in the coming editions.

The presented report was developed in a collaboration of experts from the UMC Groningen, Nefrovisie, Nivel, Radboud UMC, and UMC Amsterdam, with funding by the Dutch Kidney Foundation. The Dutch Kidney Foundation (as Funder) and UMC Groningen (as co-ordinating center) are thankful to all members of the working group and the organizations involved in producing this report.



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Brief Summary of Findings

In 2021, about 8.5% of the people aged 18 years and older known in primary care were found to have chronic kidney disease, i.e., about 1 in 12 adults in general practitioners practices were found to have chronic kidney disease, which is about 1.2 million people in total.

Most people had mild chronic kidney disease (3.9% in 2021), and nearly 1.0% of people had severe chronic kidney disease (0.9% in 2021). For a sizable percentage of people with chronic kidney disease, the risk class is unknown (2.5% in 2021).

Slightly more women than men had chronic kidney disease (9.0% vs. 8.0%, respectively in 2021).

Many more people older than 75 years had chronic kidney disease compared to those aged 75 years and younger (42.5% in those older than 75 years, 10.8% in those aged 55-75, and 0.9% in those aged less than 55 years in 2021).

The prevalence of chronic kidney disease was highest in the Southern region (Zeeland, Noord-Brabant, Limburg) (9.7% in 2021) and lowest in the Western region (Utrecht, Noord-Holland, Zuid-Holland) (7.6% in 2021) of the Netherlands.

People with an annual household income of less than 27.000 euros had a higher prevalence of chronic kidney disease (12.3% or more in 2021) compared to those with a household income of more than 27.000 euros (8.4% or less in 2021).

With an incidence of about 1.0%, nearly 130,000 people were newly identified with chronic kidney disease in the year 2021

People older than 75 years had a higher incidence of chronic kidney disease (3.9% in 2021) than those aged 75 years and younger (1.4% in those aged 55-75 and 0.1% in those younger than 55 years in 2021). Also, people with a lower annual household income had a higher incidence while people with a higher household income had a lower incidence of chronic kidney disease (1.2% or more in those with income less than 27.000 euros and 1.0% or less in those with income more than 27.000 euros in 2021).

People with chronic kidney disease more often had diabetes mellitus, hypertension, and/or heart failure compared to those not identified with chronic kidney disease. About 35% of the people with chronic kidney disease also had diabetes mellitus, almost 70% had hypertension, and about 12% had heart failure in the year 2021. In people not identified with chronic kidney disease, about 6% had diabetes mellitus, 16% had hypertension, and less than 1% had heart failure in the same year.

In people with chronic kidney disease, comorbidities (diabetes mellitus, hypertension, and/or heart failure) were more prevalent in people with severe chronic kidney disease compared to people with other risk classes of chronic kidney disease.

People with chronic kidney disease who also had diabetes mellitus or hypertension were often treated with medication for these accompanying conditions. About 72.0% of people with chronic kidney disease and diabetes mellitus were prescribed at least one antihyperglycemic medication and about 90.0% of people with chronic kidney disease and hypertension were prescribed at least one antihypertensive medication in the year 2021. Antihyperglycemic was prescribed slightly less often in women (68.9% in women and 75.1% in men in 2021) and older people (67.0% in people older than 75 years and 82.1% in those aged 18-54 years in 2021) with chronic kidney disease and diabetes mellitus.

Mortality was high in people with chronic kidney disease. About 5.0% of people with chronic kidney disease died every year between 2016 and 2021, i.e., about 63.000 people each year. Less than 1% of the people not identified with chronic kidney disease died in the same period.

In people with chronic kidney disease, men had a slightly higher mortality rate than women (6.1% in men and 4.7% in women in 2021).

In 2021, nearly 6.300 people were treated with dialysis, and more than 11.000 people aged 18 years and older were living with a functioning kidney transplant.

One should keep in mind that data on chronic kidney disease relates to people aged 18 years and older who were found to have the disease and are registered in primary care. However, there are also people in the general population with chronic kidney disease who have not yet been identified. As a result, the actual incidence and prevalence of chronic kidney disease are likely to be (considerably) higher.

Introduction

This report presents data on the percentage of people with existing chronic kidney disease (i.e., prevalence) and the percentage of people newly identified with chronic kidney disease each year (i.e., incidence) between 2016 and 2021 among adults (18 years and older) registered in primary care. The reports also present data on the percentage of people with commonly accompanied health conditions, the percentage of people on treatment for key risk factors, including diabetes mellitus and hypertension, and the rate of death in people with and without chronic kidney disease. All this data is presented by the risk classes of chronic kidney disease, sex, age groups, regions, and income levels. Chronic kidney disease was identified using diagnosis and treatment codes for chronic kidney disease and laboratory data on the kidney function and urine protein loss recorded in patient files.

The results are presented in the next chapters, followed by the methods and future perspective.

Chronic kidney disease

Chronic kidney disease is defined as abnormalities of kidney function or kidney structure that are present for longer than 3 months and that have deleterious implications for health.¹

- We speak of abnormal kidney function when it is $<60 \text{ ml/min/1.73 m}^2$. In scientific terminology, kidney function is called glomerular filtration rate or in short, GFR. The unit in which kidney function is expressed can also be interpreted as a percentage of normal kidney function. A kidney function of $<60 \text{ ml/min/1.73 m}^2$ would mean kidneys are operating at $<60\%$ of their normal capacity and a person with such kidney function for longer than 3 months will be considered as having chronic kidney disease.
- Abnormalities in kidney structure are defined as a urinary protein loss $>30 \text{ mg/day}$ (also called albuminuria. A person with urinary protein loss $>30 \text{ mg/day}$ for longer than 3 months will also be considered as having chronic kidney disease.

There are 6 stages of kidney function and 3 stages of urinary protein loss. Together, they form 18 cells that are grouped into 4 global risk classes (Figure).¹

- No chronic kidney disease, colour code green, is assumed that this represents 90% of the Dutch population.
- Mild chronic kidney disease, colour code yellow
- Moderate chronic kidney disease, colour code orange
- Severe chronic kidney disease, colour code red

Figure: Chronic kidney disease stages and risk classes

KDIGO: Prognosis of CKD by GFR and albuminuria categories				Persistent albuminuria categories		
				Description and range		
				A1	A2	A3
				Normal to mildly increased	Moderately increased	Severely increased
				$<30 \text{ mg/g}$ $<3 \text{ mg/mmol}$	$30\text{--}300 \text{ mg/g}$ $3\text{--}30 \text{ mg/mmol}$	$>300 \text{ mg/g}$ $>30 \text{ mg/mmol}$
GFR categories (ml/min/1.73 m ²) Description and range	G1	Normal or high	≥ 90			
	G2	Mildly decreased	60–89			
	G3a	Mildly to moderately decreased	45–59			
	G3b	Moderately to severely decreased	30–44			
	G4	Severely decreased	15–29			
	G5	Kidney failure	<15			

Green: low risk (if no other markers of kidney disease, no CKD); Yellow: moderately increased risk; Orange: high risk; Red: very high risk. GFR, glomerular filtration rate.

People with chronic kidney disease have an increased risk for the disease progression towards the stage of kidney failure when kidney function is less than 10%.² At that stage, there is a need to start kidney replacement therapy, such as dialysis or a kidney transplantation. In addition, there is an increased risk of cardiovascular disease (including myocardial infarction, stroke, and cardiovascular death) and death due to cardiovascular disease.² Besides these complications, patients with chronic kidney disease face an increased risk for other problems, such as an increased risk for infections and an increased risk for cancer.^{3,4}

Mild, moderate, and severe risk classes represent the levels of the risk of complications with an increase in the risk of complications from mild to severe chronic kidney disease.⁵ For instance, compared to age, sex and risk factors (smoking, systolic blood pressure, diabetes and total cholesterol)-matched people without chronic kidney disease, in people with:

- Mild chronic kidney disease (yellow), the risk for death due to cardiovascular disease is doubled, and the risk of developing kidney failure is increased 4-fold.
- Moderate chronic kidney disease (orange), the risk for death due to cardiovascular disease is increased 4-fold, and the risk of developing kidney failure is increased 10-fold or more.
- Severe chronic kidney disease (red), the risk of death due to cardiovascular disease is increased 8-fold, and the risk of developing kidney failure is increased almost 100-fold.

Brief Methods

The data presented in this report are derived from several sources:

- Nivel Primary Care Database, a database containing a dynamic cohort of people registered in approximately 500 practices (representing about 10% of all Dutch practices) spread throughout the Netherlands.
- Vektis, health care claims data containing information on patients managed in hospitals.
- Nefrodata, a registry of patients on dialysis and kidney transplant
- Statistics Netherlands (CBS), with data on socioeconomic status and mortality.

Chronic kidney disease was identified using diagnosis and treatment codes for chronic kidney disease and using laboratory data on the kidney function and urine protein loss recorded in patient files. In routine care, in some people, kidney function is impaired, but urinary protein loss has not been measured, or urinary protein loss has increased, whereas kidney function has not been measured. In such people, the risk class of chronic kidney disease can not be determined. Such people are classified as having chronic kidney disease with an unknown risk class in the various tables presented in this report. The methods are further elaborated in the methods section (page 35).

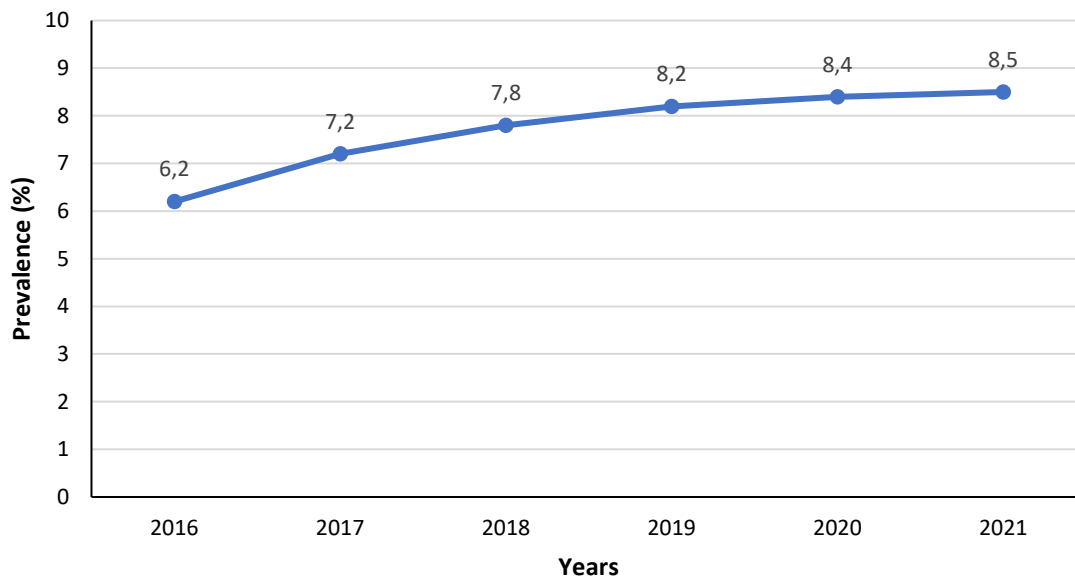
It is important to note that the data reported in the next chapters relate to patients with KNOWN chronic kidney disease among people registered in primary care, i.e., these people have recorded information on either impaired kidney function, increased albuminuria, a diagnosis or treatment code for chronic kidney disease, or combinations hereof. Besides these people, there are people in the general population who have chronic kidney disease but who do not have information on their kidney function, albuminuria or diagnosis or treatment code in the medical records and, therefore, are not yet known to have chronic kidney disease (i.e., yet undiscovered chronic kidney disease). Information on dialysis and kidney transplants was reported from Nefrodata, which has near complete coverage of people treated with dialysis and people living with functional kidney transplants in the Netherlands.

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Chapter 1: Prevalence

Figure 1.1: Percentage of people with chronic kidney disease among adults (people 18 years and older) registered in the Nivel primary care database (2016-2021)



Between 2016 and 2021, there appeared to be an increase in the prevalence of chronic kidney disease among adults registered in primary care, especially in the earlier years. This may be in part due to an aging population, the increased prevalence of risk factors for chronic kidney disease (such as obesity, hypertension, and diabetes), and improved screening for the disease. However, it could also be partly due to methodological issues (e.g., the availability of reliable medical historical data was only for two years in 2016 and longer in later years, resulting in a possible underestimation of chronic kidney disease prevalence in the earlier years). In recent years, the prevalence of chronic kidney disease among adults registered in primary care was about 8%, with a prevalence of 8.5% in 2021.

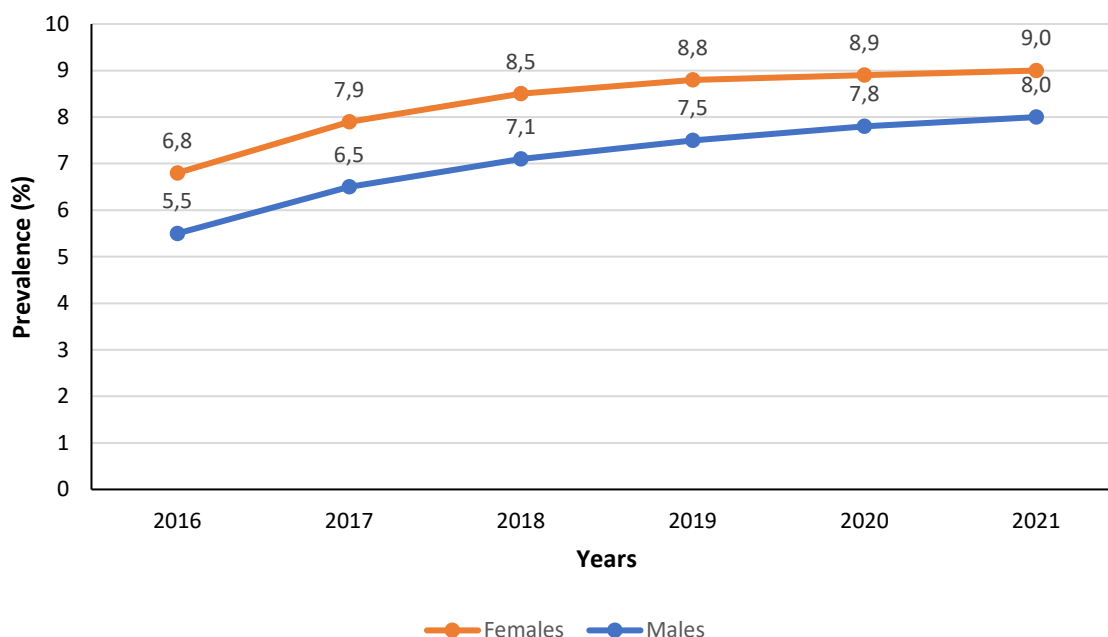
Table 1.1: Prevalence (%) of people with chronic kidney disease by risk classes of the disease

Risk classes*	2016	2017	2018	2019	2020	2021
Mild	2.5	3.0	3.3	3.6	3.8	3.9
Moderate	0.9	1.0	1.0	1.1	1.2	1.2
Severe	0.8	0.9	0.9	0.9	0.9	0.9
Unknown	2.0	2.3	2.5	2.5	2.5	2.5
Overall	6.2	7.2	7.8	8.2	8.4	8.5

*See Introduction

Most people with chronic kidney disease had mild chronic kidney disease. About 1.0% of people with chronic kidney disease had moderate or severe chronic kidney disease. For a sizeable proportion, the risk class could not be determined based on the available data.

Figure 1.2: Percentage of people with chronic kidney disease among adult females and males registered in the Nivel primary care database (2016-2021)



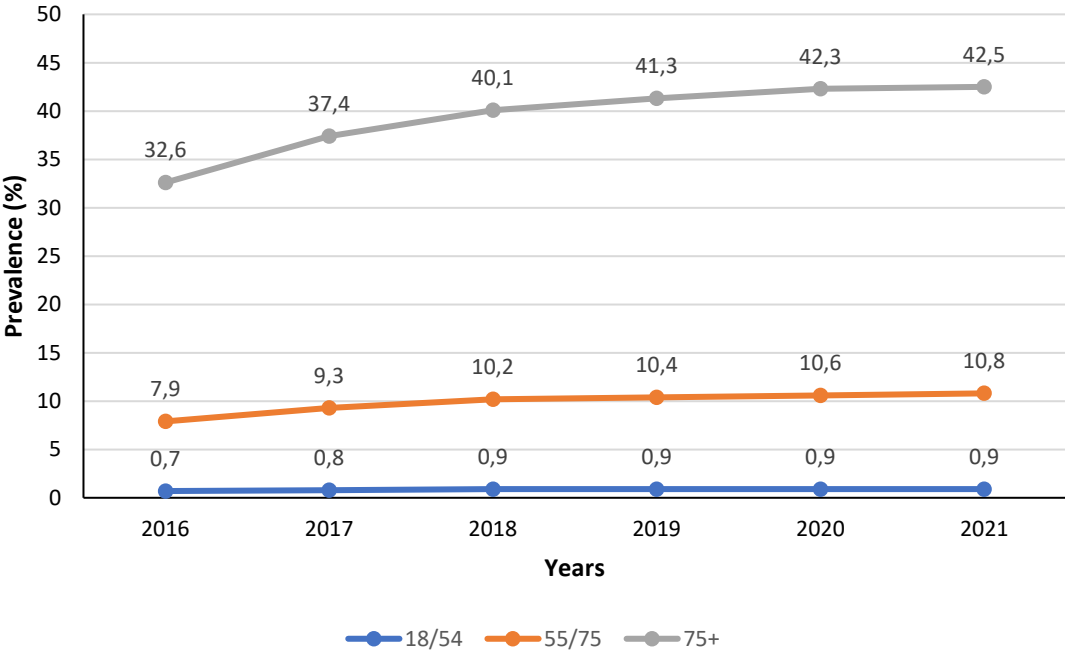
In the years between 2016 and 2021, slightly more females (orange line) than males (blue line) were identified with chronic kidney disease. In 2021, 9.0% of females and 8.0% of males were identified with chronic kidney disease.

Table 1.2: Prevalence (%) of people with chronic kidney disease among adult females and males registered in Nivel primary care database by risk classes of the disease (2016-2021)

Sex	Risk classes	2016	2017	2018	2019	2020	2021
Females	Mild	2.7	3.3	3.6	3.9	4.0	4.1
	Moderate	0.9	1.1	1.1	1.1	1.2	1.2
	Severe	0.8	0.9	0.9	0.8	0.9	0.9
	Unknown	2.4	2.7	3.0	3.0	2.9	2.9
	Overall	6.8	7.9	8.5	8.8	8.9	9.0
Males	Mild	2.3	2.7	3.1	3.3	3.6	3.7
	Moderate	0.8	0.9	1.0	1.1	1.2	1.2
	Severe	0.8	0.9	0.9	1.0	1.0	1.0
	Unknown	1.6	1.9	2.1	2.1	2.0	2.1
	Overall	5.5	6.5	7.1	7.5	7.8	8.0

In all years examined, the risk class of the disease could not be determined slightly more often among females than males. When the risk class could be determined, it was broadly comparable between males and females, with the possibility of slightly more females with mild chronic kidney disease than males.

Figure 1.3: Percentage of people with chronic kidney disease by age groups (2016-2021)



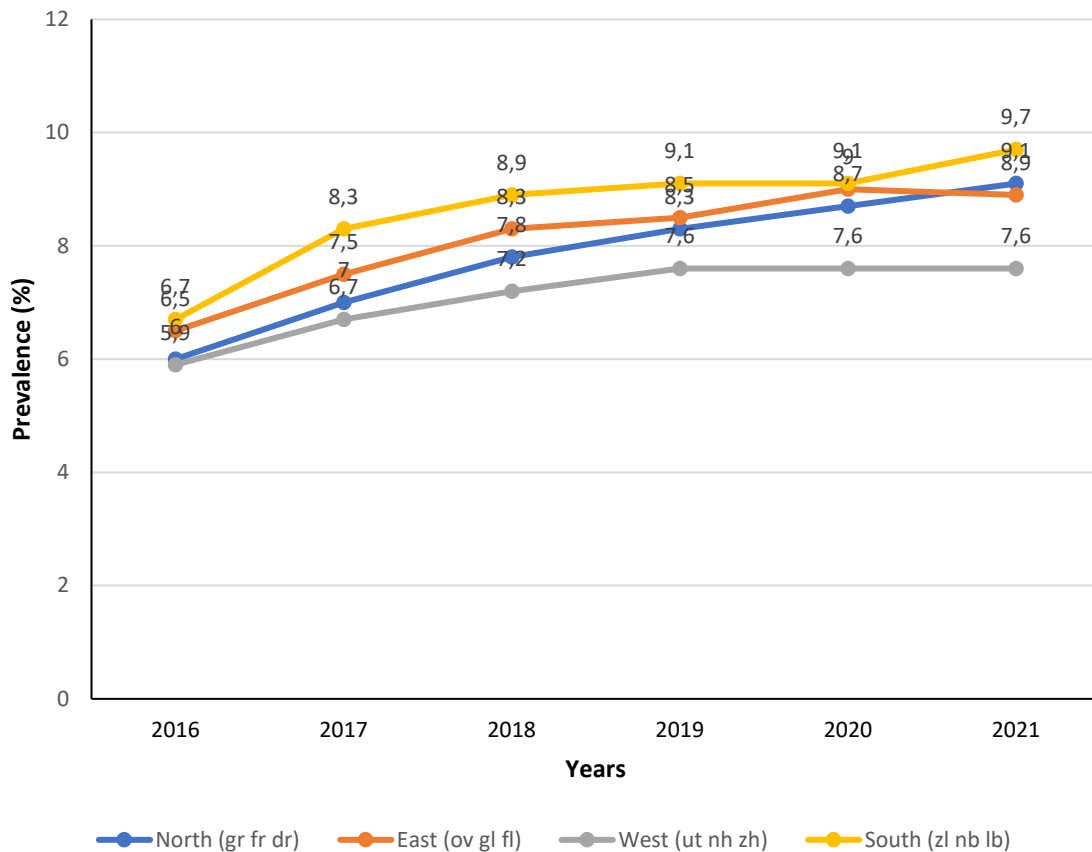
In all years, the prevalence of chronic kidney disease was highest in people 75+. In 2021, 42.5% of people aged 75+, about 10.8% of people aged 55-75, and 0.9% of people aged 18-54 were identified with chronic kidney disease. Kidney function is known to deteriorate with age, and older individuals tend to seek care more often than younger people. This may have contributed to the higher likelihood of identifying chronic kidney disease in older adults.

Table 1.3: Percentage of people with chronic kidney disease by age groups and risk classes of the disease (2016-2021)

Age groups	Risk classes	2016	2017	2018	2019	2020	2021
18-54	Mild	0.3	0.3	0.4	0.4	0.4	0.4
	Moderate	0.0	0.1	0.1	0.1	0.1	0.1
	Severe	0.1	0.1	0.1	0.1	0.1	0.1
	Unknown	0.3	0.4	0.4	0.4	0.4	0.4
	Overall	0.7	0.8	0.9	0.9	0.9	0.9
55-75	Mild	3.9	4.7	5.1	5.3	5.5	5.6
	Moderate	0.9	1.1	1.1	1.2	1.2	1.2
	Severe	0.7	0.8	0.8	0.8	0.8	0.9
	Unknown	2.3	2.8	3.1	3.1	3.0	3.1
	Overall	7.9	9.3	10.2	10.4	10.6	10.8
75+	Mild	10.7	12.8	14.5	15.8	17.1	17.4
	Moderate	5.5	6.2	6.4	6.8	7.1	7.2
	Severe	5.5	6.0	6.2	6.1	6.1	6.0
	Unknown	10.9	12.3	13.0	12.7	12.0	11.8
	Overall	32.6	37.4	40.1	41.3	42.3	42.5

In all years examined, the prevalence of chronic kidney disease of all risk classes was highest in people 75+. Mild chronic kidney disease was more prevalent than other risk classes of chronic kidney disease in all age groups.

Figure 1.4: Prevalence (%) of chronic kidney disease by regions (2016-2021)



(gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg)

Between 2016 and 2021, the prevalence of chronic kidney disease was highest in the Southern region (Zeeland, Noord-Brabant, Limburg) and lowest in the Western region (Utrecht, Noord-Holland, Zuid-Holland). In 2021, the prevalence in the Southern region was 9.7%, and in the Western region, it was 7.6%.

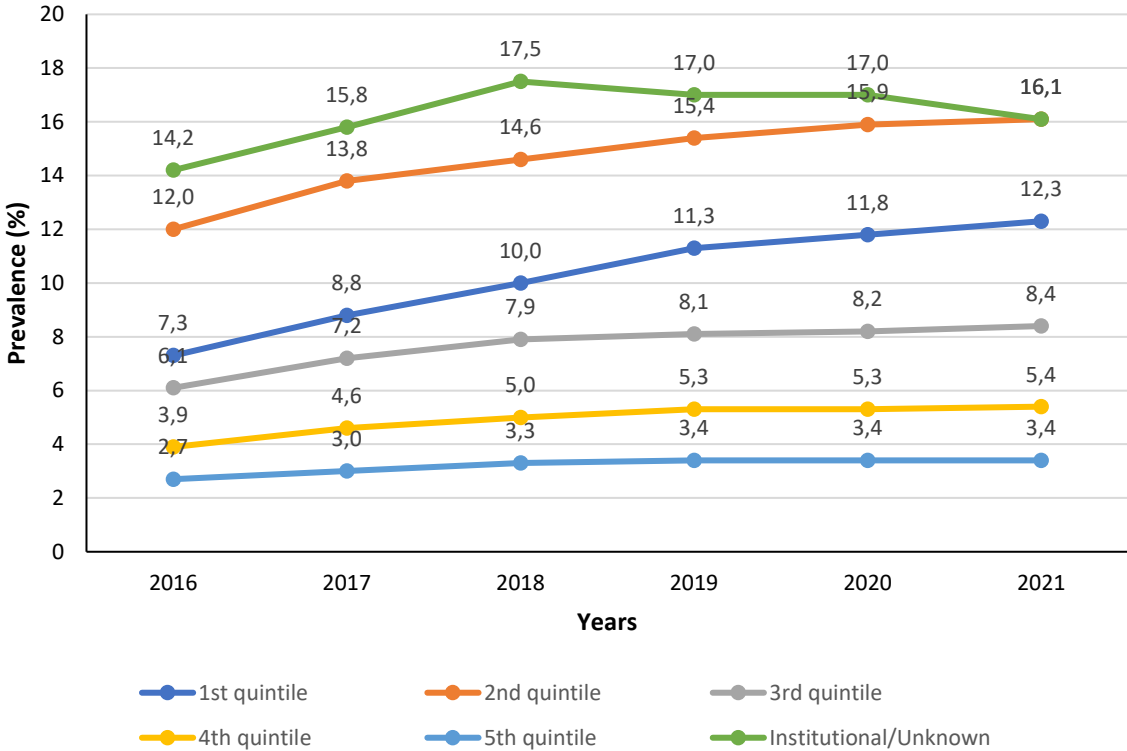
Table 1.4: Prevalence (%) of chronic kidney disease by region and risk classes of the disease (2016-2021)

Regions	Risk classes	2016	2017	2018	2019	2020	2021
North (gr fr dr)	Mild	2.3	2.8	3.3	3.5	3.8	4.1
	Moderate	0.8	0.9	1.0	1.0	1.1	1.2
	Severe	0.8	0.8	0.9	0.9	0.9	1.0
	Unknown	2.2	2.5	2.6	2.8	2.8	2.9
	Overall	6.0	7.0	7.8	8.3	8.7	9.1
East (ov gl fl)	Mild	2.7	3.2	3.5	3.9	4.2	4.3
	Moderate	0.9	1.1	1.1	1.2	1.2	1.3
	Severe	0.8	0.9	0.9	0.9	1.0	1.0
	Unknown	2.0	2.3	2.7	2.6	2.6	2.4
	Overall	6.5	7.5	8.3	8.5	9.0	8.9
West (ut nh zh)	Mild	2.2	2.6	2.9	3.2	3.3	3.4
	Moderate	0.8	0.9	1.0	1.0	1.0	1.0
	Severe	0.7	0.8	0.8	0.9	0.8	0.8
	Unknown	2.1	2.3	2.5	2.5	2.4	2.3
	Overall	5.9	6.7	7.2	7.6	7.6	7.6
South (zl nb lb)	Mild	3.0	3.8	4.2	4.3	4.4	4.5
	Moderate	1.0	1.2	1.3	1.4	1.4	1.4
	Severe	0.9	1.1	1.1	1.1	1.1	1.1
	Unknown	1.7	2.2	2.3	2.3	2.2	2.7
	Overall	6.7	8.3	8.9	9.1	9.1	9.7

(gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg)

In all years examined, the prevalence of all risk classes of chronic kidney disease was highest in the Southern region and lowest in the Western region. In 2021, the prevalence of mild, moderate, and severe chronic kidney disease was 4.5%, 1.4%, 1.1% in the Southern region and 3.4%, 1.0%, and 0.8% in the Western region, respectively. The prevalence of people with unknown risk class chronic kidney disease appeared similar across the regions.

Figure 1.5: Prevalence (%) of chronic kidney disease by household income levels (2016-2021)



(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

Over the years, the prevalence of chronic kidney diseases was generally higher in lower-income groups and lower in higher-income groups. In 2021, the prevalence of chronic kidney disease was 12.3% in the 1st income quintile, 16.1% in the 2nd, 8.4% in the 3rd, 5.4% in the 4th, and 3.4% in the 5th income quintile. It is possible that many people in the 1st income quintile were younger individuals without a regular income (e.g., students), which might explain why people in the 1st quintile had lower prevalence compared to people in the 2nd quintile. The prevalence of chronic kidney disease was also high in the institutionalized/unknown income group, with a prevalence of 16.1% in 2021.

Table 1.5: Prevalence (%) of chronic kidney disease by income levels and risk classes of the disease (2016-2021)

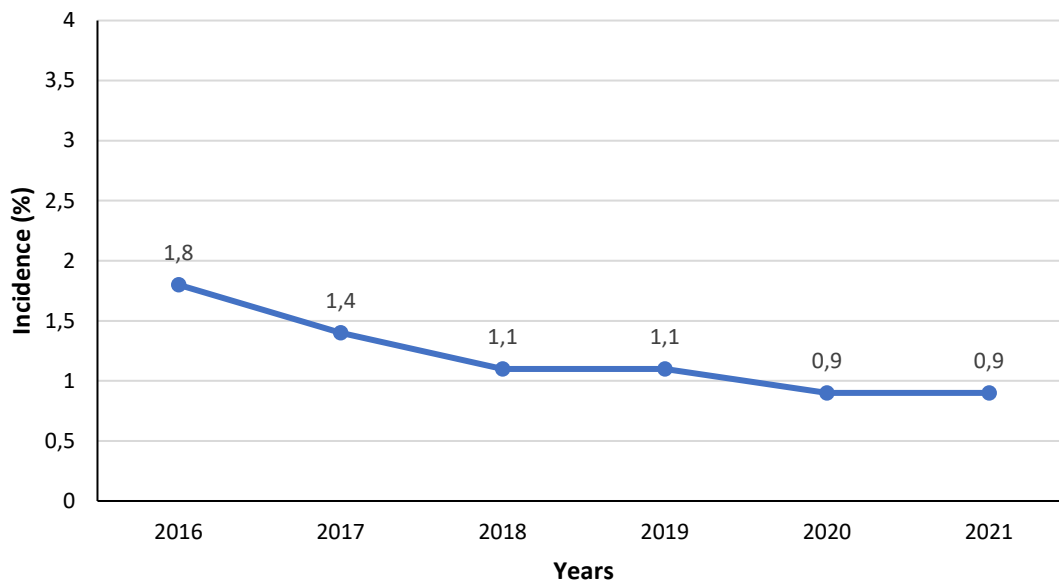
Income levels	Risk classes	2016	2017	2018	2019	2020	2021
1 st Quintile	Mild	2.7	3.4	4.0	4.5	4.9	5.2
	Moderate	1.1	1.3	1.4	1.7	1.8	1.8
	Severe	1.1	1.3	1.4	1.6	1.7	1.7
	Unknown	2.4	2.8	3.1	3.4	3.4	3.5
	Overall	7.3	8.8	10.0	11.3	11.8	12.3
2 nd Quintile	Mild	4.8	5.7	6.1	6.7	7.3	7.4
	Moderate	1.9	2.1	2.2	2.3	2.4	2.5
	Severe	1.7	1.8	1.8	1.8	1.9	1.9
	Unknown	3.6	4.2	4.5	4.5	4.3	4.4
	Overall	12.0	13.8	14.6	15.4	15.9	16.1
3 rd Quintile	Mild	2.6	3.2	3.6	3.8	4.0	4.0
	Moderate	0.9	1.0	1.0	1.1	1.1	1.2
	Severe	0.7	0.8	0.8	0.8	0.8	0.8
	Unknown	1.9	2.2	2.5	2.4	2.4	2.4
	Overall	6.1	7.2	7.9	8.1	8.2	8.4
4 th Quintile	Mild	1.7	2.0	2.3	2.5	2.5	2.6
	Moderate	0.5	0.6	0.6	0.6	0.6	0.6
	Severe	0.4	0.4	0.5	0.5	0.5	0.5
	Unknown	1.3	1.6	1.7	1.7	1.6	1.6
	Overall	3.9	4.6	5.0	5.3	5.3	5.4
5 th Quintile	Mild	1.2	1.4	1.5	1.6	1.6	1.6
	Moderate	0.3	0.3	0.3	0.3	0.3	0.4
	Severe	0.3	0.3	0.3	0.3	0.3	0.3
	Unknown	1.0	1.1	1.1	1.2	1.1	1.1
	Overall	2.7	3.0	3.3	3.4	3.4	3.4
Institutional/Unknown	Mild	2.6	3.3	4.1	4.4	4.7	4.4
	Moderate	1.8	1.9	2.0	2.3	2.2	2.0
	Severe	3.4	3.5	3.6	3.1	3.2	2.9
	Unknown	6.4	7.1	7.7	7.2	6.8	6.7
	Overall	14.2	15.8	17.5	17.0	17.0	16.1

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

In all years examined, the prevalence of all risk classes of chronic kidney disease was higher in people in 1st income quintile, 2nd income quintile, and Institutional/Unknown income group compared to people in the 3rd, 4th, and 5th income quintiles. Unknown risk class chronic kidney disease appeared most prevalent in people in the institutionalized/unknown income group.

Chapter 2: Incidence

Figure 2.1: Percentage of people newly identified with chronic kidney disease every year among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



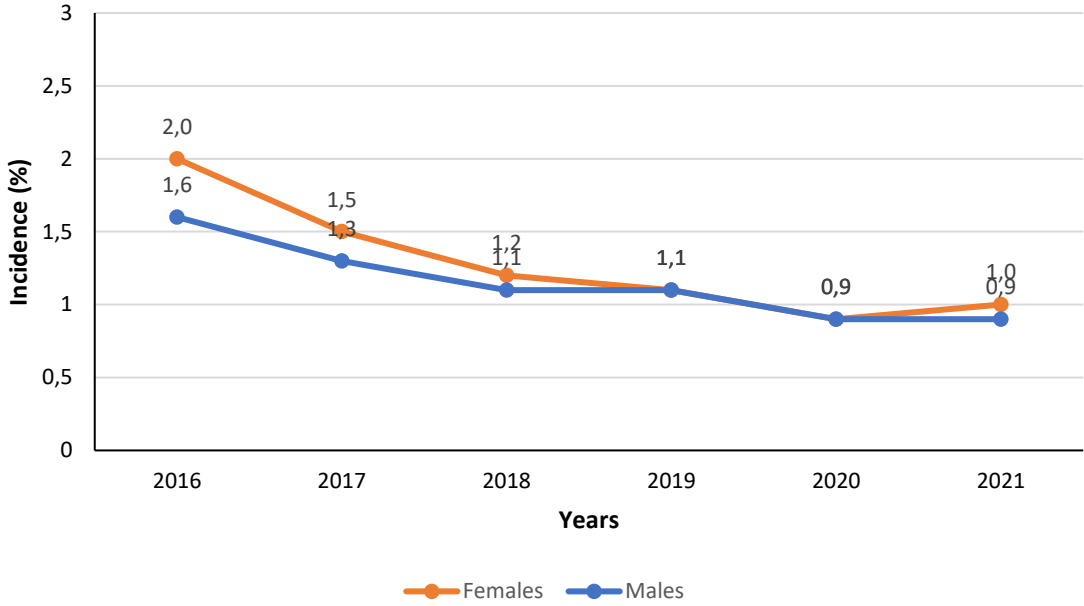
Between 2016 and 2021, incidence, i.e., the percentage of people newly identified with chronic kidney disease in a given year, changed from 1.8% in the year 2016 to 0.9% in the year 2021. This decline may partly be due to the availability of longer medical histories in later years, which makes it more likely to correctly identify true new cases of chronic kidney disease. As a result, the chances of mistakenly classifying someone as a new case when they actually had the disease before the study period are reduced.

Figure 2.2: Percentage of adult people newly identified with chronic kidney disease every year by risk classes of chronic kidney disease (2016-2021)

Risk classes	2016	2017	2018	2019	2020	2021
Mild	0.8	0.7	0.5	0.5	0.5	0.5
Moderate	0.2	0.1	0.1	0.1	0.1	0.1
Severe	0.1	0.1	0.1	0.1	0.0	0.0
Unknown	0.7	0.5	0.4	0.4	0.3	0.3
Overall	1.8	1.4	1.1	1.1	0.9	0.9

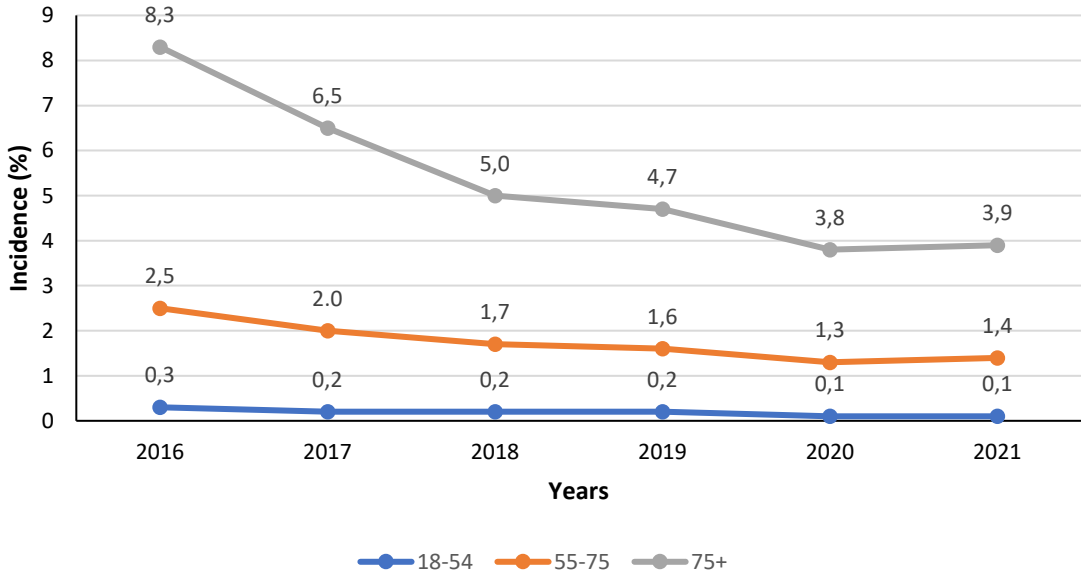
Over the years examined, the incidence of chronic kidney disease with mild chronic kidney disease was highest, and the incidence of chronic kidney disease with severe chronic kidney disease was lowest. In 2021, the incidence of mild chronic kidney disease was 0.5%. In the same year, the incidence of severe chronic kidney disease was near 0%, likely due to the shielding of people at high risk of COVID-19 complications, including people with severe chronic kidney disease, and therefore limited visits to healthcare institutions during the COVID-19 period.

Figure 2.3: Percentage of adult people newly identified with chronic kidney disease every year by sex (2016-2021)



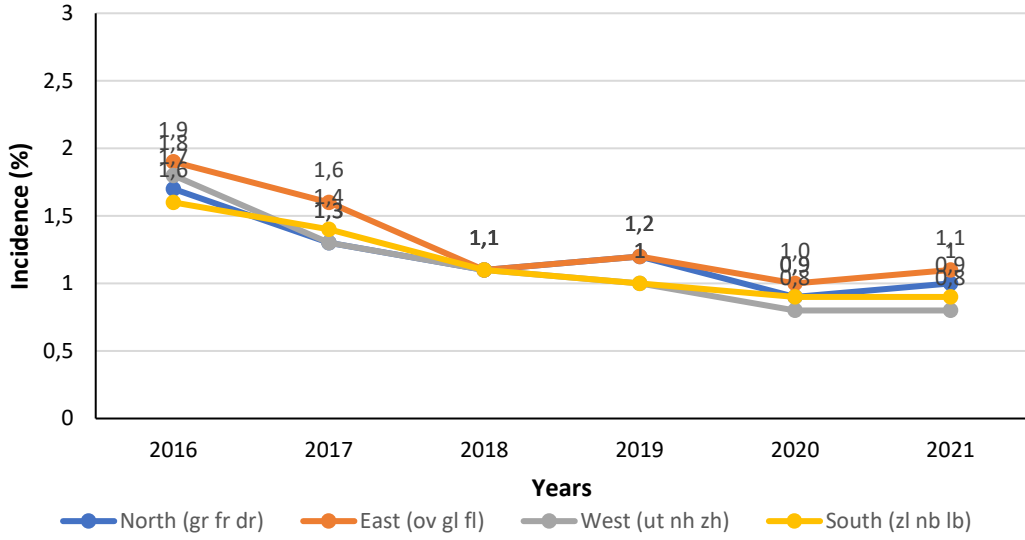
Between 2016 and 2018, slightly more females than males were newly identified with chronic kidney disease. After 2018, the incidence of chronic kidney disease in males and females was more comparable, with an incidence of about 1.0% each year in both groups.

Figure 2.4: Percentage of adult people newly identified with chronic kidney disease every year by age group (2016-2021)



In all years, the incidence of chronic kidney disease was highest in people aged 75+ and lowest in people aged 18-54. In 2021, 3.9% of people aged 75+, 1.4% of people aged 55-75, and 0.1% of people aged 18-54 were newly diagnosed with chronic kidney disease.

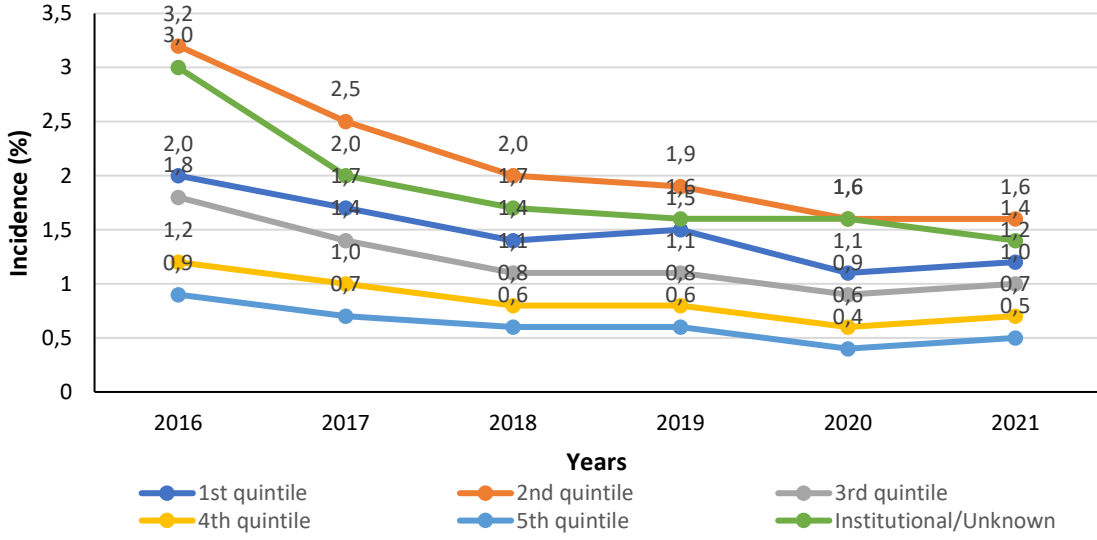
Figure 2.5: Percentage of adult people newly identified with chronic kidney disease every year by regions (2016-2021)



(gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg)

In all years, the incidence of chronic kidney disease was generally similar across the four regions. In 2021, the incidence was 1%, 1.1%, 0.8%, and 0.9% in Northern, Eastern, Western and Southern regions, respectively.

Figure 2.6: Percentage of adult people newly identified with chronic kidney disease every year by income levels (2016-2021)

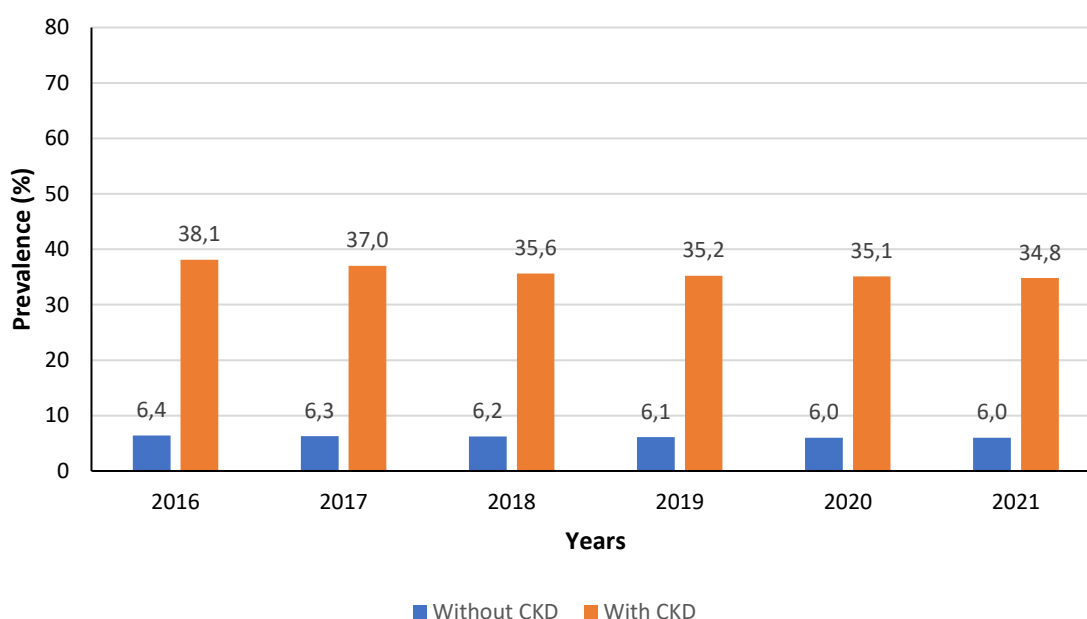


(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

Between 2016 and 2021, the incidence of chronic kidney diseases was generally higher in lower income quintiles and lower in higher income quintiles. In 2021, the incidence of chronic kidney disease was 1.2% in the 1st income quintile, 1.6% in the 2nd, 1.0% in the 3rd, 0.7% in the 4th, and 0.5% in the 5th income quintile. Incidence in the institutionalized/unknown income group was 1.4%.

Chapter 3: Comorbidities (diabetes, hypertension and heart failure)

Figure 3.1: Prevalence (%) of diabetes mellitus in those with and without chronic kidney disease among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



CKD=Chronic kidney disease

In all years, people with chronic kidney disease had more often diabetes mellitus than those without chronic kidney disease. In 2021, 34.8% of people with chronic kidney disease and about 6.0% of people without known chronic kidney disease (also) had diabetes mellitus (Type II, Type I, or other types).

Table 3.1: Prevalence of diabetes mellitus in those with chronic kidney disease by risk classes of the disease

Risk classes	2016	2017	2018	2019	2020	2021
Mild	44.0	42.0	39.6	38.0	37.4	36.4
Moderate	50.7	49.7	46.4	44.6	43.7	43.4
Severe	48.1	47.8	47.4	47.1	46.8	46.8
Unknown	21.1	20.8	21.6	22.9	23.0	23.4

Throughout all the years examined, the prevalence of diabetes mellitus was higher in people with severe chronic kidney disease than in people with mild or moderate chronic kidney disease. The prevalence of diabetes mellitus was lowest in people whose risk classes of chronic kidney disease could not be determined. In 2021, the prevalence of diabetes mellitus was 46.8% in those with severe chronic kidney disease, while the prevalence of diabetes mellitus was 23.4% in those with the unknown risk class chronic kidney disease.

Table 3.2: Prevalence (%) of diabetes mellitus in those with and without chronic kidney disease by sex, age groups, regions, and income levels

	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	42.0	41.7	40.5	40.2	40.2	40.4
	Females	35.0	34.9	33.9	34.1	34.1	33.7
-No CKD	Males	7.0	6.9	6.8	6.7	6.7	6.6
	Females	5.9	5.7	5.5	5.4	5.4	5.3
Age groups							
- CKD	18-54	23.3	23.8	24.3	23.0	21.8	23.9
	55-75	35.8	36.4	36.9	37.3	38.0	38.1
	75+	40.0	39.8	38.3	38.3	38.3	38.3
- No CKD	18-54	2.3	2.4	2.3	2.3	2.3	2.3
	55-75	12.0	11.9	11.5	11.3	11.1	11.0
	75+	16.8	16.4	16.3	16.2	16.2	16.0
Regions							
- CKD	North(gr fr dr)	38.0	37.3	36.2	36.9	36.3	36.8
	East (ov gl fl)	40.1	38.7	37.9	36.5	36.4	35.5
	West (ut nh zh)	38.4	38.8	37.8	38.7	38.9	39.2
	South (zl nb lb)	35.7	36.0	34.4	33.9	34.8	34.4
- No CKD	Noord (gr fr dr)	6.8	6.6	6.7	6.7	6.7	7.0
	Oost (ov gl fl)	6.6	6.4	6.3	6.2	6.1	5.9
	West (ut nh zh)	6.3	6.2	6.0	6.0	5.8	5.7
	Zuid (zl nb lb)	6.3	6.2	5.9	5.9	6.0	5.9
Income levels							
-CKD	1 st Quintile	43.8	45.2	44.0	43.5	44.2	44.4
	2 nd Quintile	41.0	40.0	38.8	38.7	38.3	38.0
	3 rd Quintile	36.0	36.3	35.4	35.4	35.1	34.5
	4 th Quintile	32.0	31.7	30.4	31.4	30.7	30.9
	5 th Quintile	29.7	28.9	29.1	27.9	28.6	28.6
	Institutional/Unknown	43.5	42.4	38.0	39.4	39.1	39.6
-No CKD	1 st Quintile	8.2	8.5	8.7	8.8	8.9	8.9
	2 nd Quintile	10.0	9.8	9.4	9.3	9.4	9.2
	3 rd Quintile	6.5	6.3	6.2	6.2	6.2	6.0
	4 th Quintile	5.0	4.9	4.8	4.7	4.6	4.6
	5 th Quintile	4.0	3.8	3.6	3.7	3.5	3.4
	Institutional/Unknown	8.1	6.9	7.0	6.7	6.2	6.5

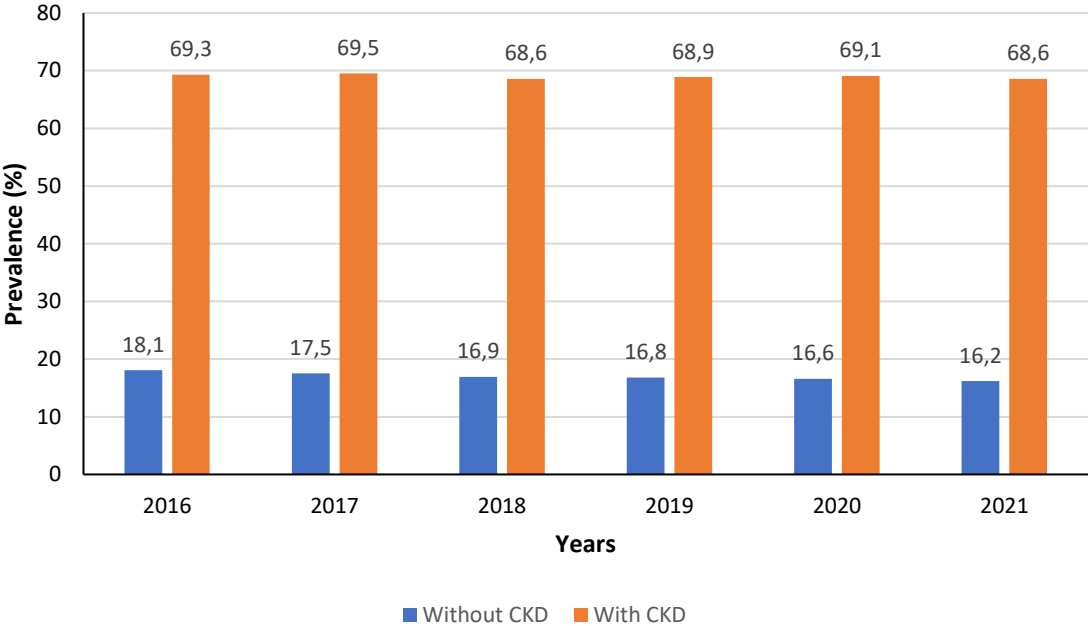
CKD=Chronic kidney disease,

gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

In all years, people with chronic kidney disease in all subgroups had a higher prevalence of diabetes mellitus compared to their counterparts without known chronic kidney disease. Males, people in the age group of 75+ years, and lower income levels had a higher prevalence of diabetes mellitus in those with and without known chronic kidney disease. People aged 18 to 54 years with chronic kidney disease had a higher prevalence of diabetes mellitus compared with people of any age group without known chronic kidney disease.

Figure 3.2: Prevalence (%) of hypertension in those with and without chronic kidney disease among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



CKD=Chronic kidney disease

In all years, people with chronic kidney disease had more often hypertension than those without chronic kidney disease. In 2021, about 68.6% of people with chronic kidney disease and 16.2% of the people without known chronic kidney disease also had hypertension.

Table 3.4: Prevalence (%) of hypertension in those with chronic kidney disease by risk classes of the disease

Risk classes	2016	2017	2018	2019	2020	2021
Mild	72.3	72.3	71.5	71.7	71.9	71.2
Moderate	75.6	77.1	76.6	75.7	75.6	74.8
Severe	71.4	72.7	72.5	73.1	73.9	73.9
Unknown	61.9	61.4	60.1	60.5	60.0	59.3

The prevalence of hypertension was slightly higher in people with moderate chronic kidney disease compared to people with mild or severe chronic kidney disease or in people with unknown risk class chronic kidney disease. In 2021, the prevalence of diabetes mellitus was about 74.8% in those with moderate, 73.9% in those with severe, and 71.2% in those with mild chronic kidney disease. The prevalence of hypertension was about 60% in people with the unknown risk class chronic kidney disease.

Table 3.5: Prevalence (%) of hypertension in those with chronic kidney disease by sex, age groups, regions, and income levels

	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	66.5	66.6	66.0	66.4	66.7	66.1
	Females	71.5	71.7	70.7	71.0	71.2	70.7
-No CKD	Males	16.7	16.3	15.8	15.8	15.6	15.3
	Females	19.5	18.6	17.9	17.8	17.5	17.0
Age groups							
-CKD	18-54	52.5	53.0	52.1	51.3	50.8	49.7
	55-75	69.6	69.7	68.5	68.6	68.5	67.7
	75+	71.0	71.3	70.8	71.3	71.7	71.5
-No CKD	18-54	6.4	6.2	5.8	5.6	5.4	5.2
	55-75	33.4	32.8	32.2	31.8	31.3	30.7
	75+	50.4	49.8	48.9	49.4	49.9	49.2
Regions							
-CKD	North (gr fr dr)	64.1	66.7	66.7	67.8	69.1	69.2
	East (ov gl fl)	72.9	72.7	70.8	70.0	70.6	69.5
	West (ut nh zh)	69.9	69.6	69.1	69.2	68.9	68.4
	South (zl nb lb)	67.6	67.8	66.8	67.7	68.2	67.4
-No CKD	North (gr fr dr)	18.0	18.2	18.0	17.7	17.8	18.2
	East (ov gl fl)	19.0	18.6	17.8	17.7	17.4	17.1
	West (ut nh zh)	18.0	16.7	16.0	15.8	15.1	14.6
	South (zl nb lb)	17.6	17.7	17.3	17.7	18.0	17.7
Income levels							
-CKD	1 st Quintile	68.4	68.9	68.4	69.0	69.5	69.1
	2 nd Quintile	71.3	71.3	70.7	71.0	71.6	71.0
	3 rd Quintile	70.1	69.7	68.8	68.8	68.8	68.5
	4 th Quintile	68.4	69.1	67.7	67.5	67.8	66.6
	5 th Quintile	66.1	66.2	64.1	64.9	63.5	62.4
	Institutional/Unknown	61.7	63.2	64.3	65.8	66.3	66.9
-No CKD	1 st Quintile	16.8	16.7	17.0	17.4	17.5	17.4
	2 nd Quintile	25.5	24.7	23.8	23.6	23.8	23.2
	3 rd Quintile	18.9	18.3	17.9	17.7	17.6	17.3
	4 th Quintile	16.1	15.6	15.1	15.0	14.7	14.3
	5 th Quintile	14.7	13.9	13.1	13.2	12.4	12.0
	Institutional/Unknown	18.2	17.2	16.0	15.3	14.7	15.0

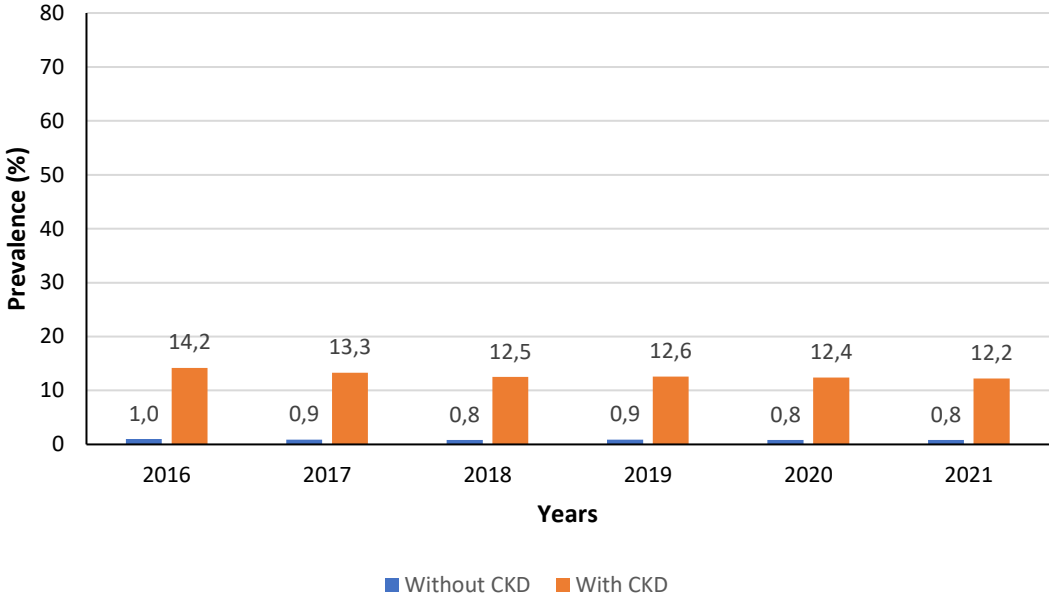
CKD=Chronic kidney disease,

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(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

Between 2016 and 2021, people with chronic kidney disease of any subgroup had a higher prevalence of hypertension compared to their counterparts without known chronic kidney disease. Females, people older than 75 years, and those in lower quintiles of income levels had a higher prevalence of hypertension in both groups, i.e., with and without known chronic kidney disease.

Figure 3.3: Prevalence (%) of heart failure in those with and without chronic kidney disease among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



CKD=Chronic kidney disease

Between 2016 and 2021, about 12.0% to 14.0% of people with chronic kidney disease and about 1.0% of those not known to have chronic kidney disease also had heart failure.

Table 3.6: Prevalence (%) of heart failure in those with chronic kidney disease by risk classes of the disease

Risk classes	2016	2017	2018	2019	2020	2021
Mild	7.3	6.8	6.5	7.0	7.2	7.3
Moderate	13.8	13.5	13.1	13.3	13.3	13.1
Severe	28.9	28.3	27.4	27.3	27.1	26.9
Unknown	16.9	15.9	14.9	14.8	14.5	13.9

From 2016 to 2021, the prevalence of heart failure was highest in people with severe chronic kidney disease and lowest in people with mild chronic kidney disease. The prevalence of heart failure in people with unknown risk class chronic kidney disease was more comparable to people with moderate chronic kidney disease than those with other risk classes of chronic kidney disease. In 2021, 7.3% of the people with mild chronic kidney disease, 13.1% with moderate chronic kidney disease, 26.9% with severe chronic kidney disease, and 13.9% with unknown risk class chronic kidney disease also had heart failure.

Table 3.7: Prevalence (%) of heart failure in those with and without chronic kidney disease by sex, age groups, regions, and income levels

	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	14.0	13.3	12.5	12.7	12.5	12.4
	Females	14.3	13.3	12.6	12.5	12.3	12.0
-No CKD	Males	1.0	0.9	0.9	0.9	0.9	0.9
	Females	1.0	0.9	0.8	0.8	0.8	0.7
Age groups							
-CKD	18-54	2.7	2.5	2.6	2.5	2.4	2.5
	55-75	7.3	7.1	6.6	6.7	6.8	6.9
	75+	20.8	19.6	18.6	18.4	18.0	17.5
-No CKD	18-54	0.1	0.1	0.1	0.1	0.1	0.1
	55-75	1.2	1.2	1.2	1.2	1.2	1.2
	75+	7.7	6.8	6.2	6.1	5.7	5.5
Regions							
-CKD	North (gr fr dr)	15.2	14.2	13.2	14.3	14.8	14.8
	East (ov gl fl)	13.5	13.2	12.0	12.7	12.7	12.4
	West (ut nh zh)	14.7	13.5	13.1	12.3	12.0	11.8
	South (zl nb lb)	13.3	12.6	11.5	11.6	11.6	11.3
-No CKD	North (gr fr dr)	1.2	1.1	1.0	1.3	1.4	1.4
	East (ov gl fl)	1.0	0.9	0.8	0.8	0.8	0.8
	West (ut nh zh)	1.0	0.9	0.8	0.8	0.7	0.7
	South (zl nb lb)	1.0	0.9	0.8	0.8	0.8	0.8
Income							
-CKD	1 st Quintile	17.6	16.9	15.7	16.1	16.8	15.9
	2 nd Quintile	15.3	14.6	13.7	13.7	13.1	13.1
	3 rd Quintile	11.8	10.8	10.0	10.0	9.7	10.1
	4 th Quintile	9.3	8.8	8.3	8.8	8.5	8.2
	5 th Quintile	8.1	7.5	7.1	7.3	7.3	6.8
	Institutional/Unknown	36.5	34.4	33.3	32.3	30.6	29.3
-No CKD	1 st Quintile	1.5	1.4	1.3	1.3	1.3	1.3
	2 nd Quintile	1.9	1.8	1.6	1.6	1.5	1.5
	3 rd Quintile	0.9	0.8	0.8	0.8	0.8	0.8
	4 th Quintile	0.6	0.5	0.5	0.5	0.5	0.5
	5 th Quintile	0.4	0.3	0.3	0.4	0.3	0.3
	Institutional/Unknown	4.4	3.8	3.0	2.8	2.6	2.5

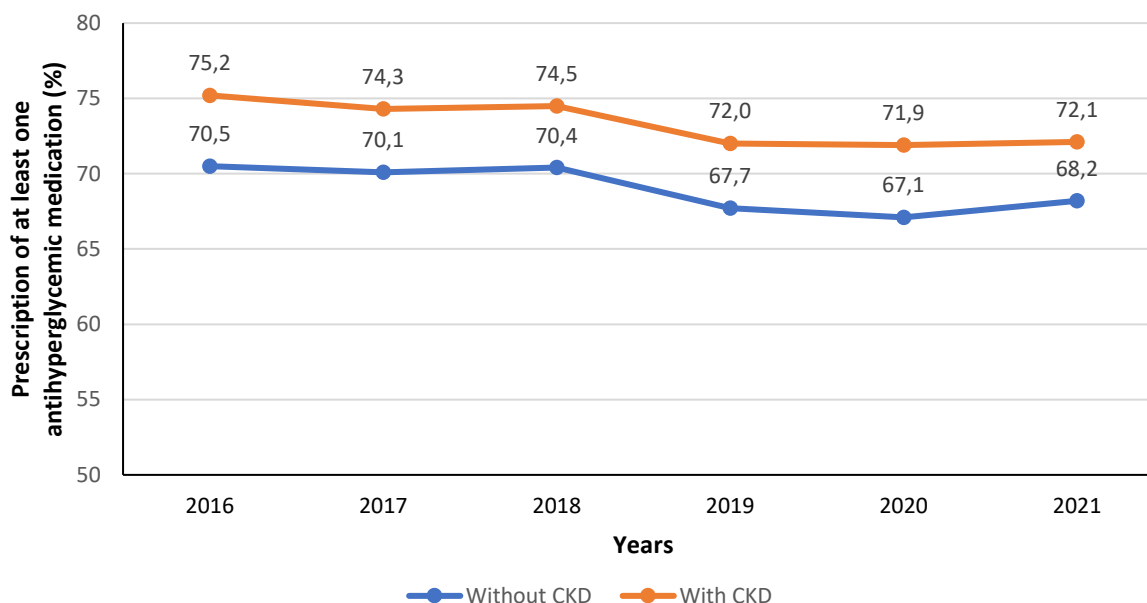
CKD=chronic kidney disease, gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

In all years examined, the prevalence of heart failure in people with chronic kidney disease of either sex or any age group, region, or income level was higher compared to their counterparts without known chronic kidney disease. The prevalence of heart failure was comparable between men and women, though it was higher in older people with or without known chronic kidney disease. Those living in the north had a slightly higher prevalence of heart failure in both groups, i.e., with and without known chronic kidney disease.

Chapter 4: Treatment for diabetes mellitus and hypertension

Figure 4.1: Percentage of people with chronic kidney disease and diabetes mellitus prescribed at least one antihyperglycemic medication among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



CKD=Chronic kidney disease

In the years examined, the percentage of people with diabetes mellitus prescribed at least one antihyperglycemic medication was higher in people with chronic kidney disease than those without chronic kidney disease. In those with chronic kidney disease and diabetes mellitus, 71.9% to 75.2% were prescribed at least one antihyperglycemic medication in the period between 2016 and 2021. In people with no known chronic kidney disease and diabetes mellitus, 67.1% to 70.5% were prescribed at least one antihyperglycemic medication in the same period. In both groups, there was a slight decline in prescription post-2018.

Table 4.1: Percentage of people with chronic kidney disease and diabetes mellitus prescribed antihyperglycemic medication(s) by risk classes of the chronic kidney disease

Risk classes	2016	2017	2018	2019	2020	2021
Mild	75.9	75.5	75.2	72.2	71.8	72.1
Moderate	76.4	75.6	76.5	73.6	74.8	74.5
Severe	76.7	74.5	76.1	73.7	72.6	73.0
Unknown	70.9	69.6	69.9	68.7	68.7	69.2

In all examined years, the rate of prescription of antihyperglycemic medication was generally comparable among people with different risk classes of chronic kidney disease. The rate of prescription of antihyperglycemic medication was lower in people with unknown risk class chronic kidney disease. In 2021, the prescription of at least one antihyperglycemic medication was 72.1%, 74.5%, 73.0%, and 69.2% in people with mild, moderate, severe, and unknown risk class chronic kidney disease, respectively.

Table 4.2: Percentage of people with and without known chronic kidney disease and diabetes mellitus prescribed antihyperglycemic medication(s) by sex, age groups, regions, and income levels

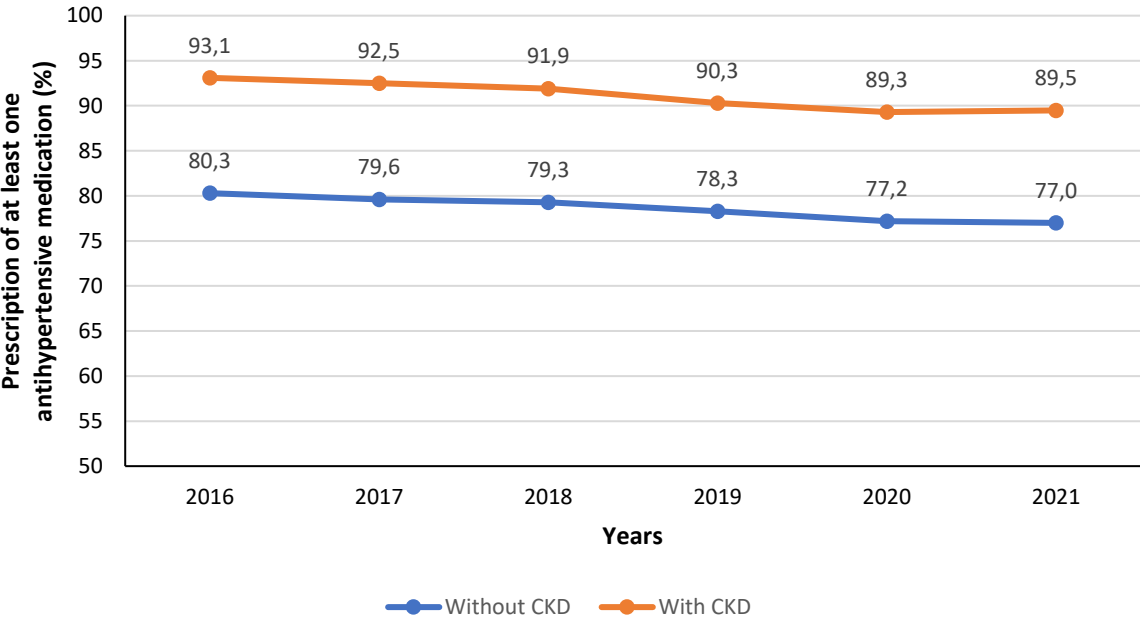
	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	78.1	77.2	77.8	75.0	74.8	75.1
	Females	72.5	71.5	71.4	68.9	68.9	68.9
-No CKD	Males	72.0	71.8	72.1	69.3	68.8	69.9
	Females	68.7	68.0	68.2	65.8	65.0	66.1
Age groups							
-CKD	18-54	83.8	82.6	82.9	80.8	81.1	82.1
	55-75	78.8	78.2	78.3	76.5	76.2	76.7
	75+	71.5	70.1	70.4	67.2	67.3	67.0
-No CKD	18-54	72.6	72.1	72.6	69.6	69.0	70.3
	55-75	70.9	70.6	70.8	68.2	67.9	69.2
	75+	66.6	65.5	65.9	63.5	61.7	61.9
Regions							
-CKD	North (gr fr dr)	77.5	77.4	77.3	74.9	74.3	73.4
	East (ov gl fl)	74.2	74.0	74.1	70.2	70.6	71.0
	West (ut nh zh)	75.8	74.5	74.2	72.0	71.7	71.8
	South (zl nb lb)	73.8	72.6	73.8	71.9	72.2	73.2
-No CKD	North (gr fr dr)	73.6	73.4	73.1	70.6	69.4	69.4
	East (ov gl fl)	68.4	68.2	69.4	66.1	65.6	67.8
	West (ut nh zh)	70.9	70.1	70.1	67.4	67.0	67.8
	South (zl nb lb)	69.5	69.7	69.6	68.1	67.5	68.7
Income							
-CKD	1 st Quintile	76.5	76.5	76.5	73.9	73.9	73.6
	2 nd Quintile	75.3	74.8	74.7	71.9	71.3	71.7
	3 rd Quintile	74.6	73.3	74.0	71.1	71.8	71.4
	4 th Quintile	74.1	72.5	73.6	71.3	71.3	71.8
	5 th Quintile	77.6	75.5	75.3	73.3	73.2	74.6
	Institutional/Unknown	71.0	65.2	65.3	62.3	61.8	61.7
-No CKD	1 st Quintile	73.1	72.5	73.3	70.2	70.4	70.3
	2 nd Quintile	71.2	70.6	70.1	67.7	66.0	67.6
	3 rd Quintile	69.7	69.6	70.1	67.4	66.9	68.1
	4 th Quintile	69.5	69.7	69.7	66.7	66.6	68.4
	5 th Quintile	70.1	68.4	69.1	67.2	65.6	66.8
	Institutional/Unknown	58.1	58.2	58.8	56.0	59.9	61.3

CKD=chronic kidney disease, gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

For all examined subgroups of people, prescription of one or more antihyperglycemic medication(s) was higher in people with diabetes mellitus and chronic kidney disease than in people with diabetes mellitus without known chronic kidney disease. Prescription of one or more antihyperglycemic medication(s) was lower in females and older people with diabetes mellitus with or without known chronic kidney disease.

Figure 4.2: Percentage of people with chronic kidney disease and hypertension prescribed at least one antihypertensive medication among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



CKD=Chronic kidney disease

In the period examined, people with hypertension and chronic kidney disease were prescribed one or more antihypertensive medications more often than people with hypertension without known chronic kidney disease. Throughout the period, there was a continued decline in the prescription of antihypertensive medications in people with hypertension with and without chronic kidney disease.

Table 4.3: Percentage of people with chronic kidney disease and hypertension prescribed antihypertensive medication(s) by risk classes of the chronic kidney disease

Risk classes	2016	2017	2018	2019	2020	2021
Mild	93.3	93.0	92.3	90.7	89.9	89.8
Moderate	95.0	94.2	94.2	92.6	91.1	91.6
Severe	94.1	93.8	93.3	91.9	91.0	91.1
Unknown	91.4	90.3	89.5	87.7	86.3	86.8

In all years examined, the rate of prescription of antihyperglycemic medication was comparable among people with different risk classes of the disease but was slightly less in people with unknown risk class chronic kidney disease.

Table 4.4: Percentage of people with and without known chronic kidney disease and hypertension prescribed antihypertensive medication(s) by sex, age groups, regions, and income levels

	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	93.7	93.3	92.5	91.0	89.8	90.0
	Females	92.8	91.9	91.4	89.8	88.9	89.1
-No CKD	Males	80.4	79.9	79.8	78.9	78.9	77.9
	Females	80.3	79.3	78.8	77.7	76.6	76.2
Age groups							
-CKD	18-54	90.2	88.1	87.1	86.1	86.3	86.1
	55-75	93.6	93.4	92.3	91.2	90.0	90.1
	75+	93.1	92.2	92.0	90.0	89.0	89.3
-No CKD	18-54	68.2	67.6	67.1	66.6	64.9	64.0
	55-75	83.2	82.4	82.0	80.8	79.7	79.5
	75+	85.2	84.7	84.3	82.7	82.3	82.2
Regions							
-CKD	North (gr fr dr)	94.6	93.6	93.5	92.9	92.3	91.7
	East (ov gl fl)	93.4	92.4	91.4	88.8	87.7	88.9
	West (ut nh zh)	92.7	92.0	91.2	89.5	87.8	87.9
	South (zl nb lb)	93.0	93.2	92.9	92.1	91.9	91.9
-No CKD	North (gr fr dr)	80.9	81.0	80.9	80.2	80.5	79.4
	East (ov gl fl)	80.2	78.9	77.7	77.7	75.4	76.1
	West (ut nh zh)	79.6	78.8	78.4	76.6	75.1	75.3
	South (zl nb lb)	81.6	81.2	81.9	81.2	81.0	80.2
Income							
-CKD	1 st Quintile	92.4	91.9	91.2	89.9	87.5	88.0
	2 nd Quintile	94.2	93.7	93.2	91.6	90.6	91.0
	3 rd Quintile	93.5	93.0	92.3	91.0	90.5	90.4
	4 th Quintile	93.1	92.6	92.3	90.1	89.4	89.4
	5 th Quintile	91.7	91.9	90.7	89.3	88.6	88.0
	Institutional/Unknown	87.4	80.9	80.3	76.8	77.8	78.4
-No CKD	1 st Quintile	80.3	79.4	79.5	78.8	77.1	77.4
	2 nd Quintile	83.9	83.2	82.7	81.4	80.2	80.2
	3 rd Quintile	81.2	80.6	80.1	79.2	78.3	78.3
	4 th Quintile	79.0	78.4	78.0	76.9	76.0	75.7
	5 th Quintile	77.2	76.3	76.2	75.3	74.6	73.7
	Institutional/Unknown	68.4	66.7	66.5	65.4	65.5	62.0

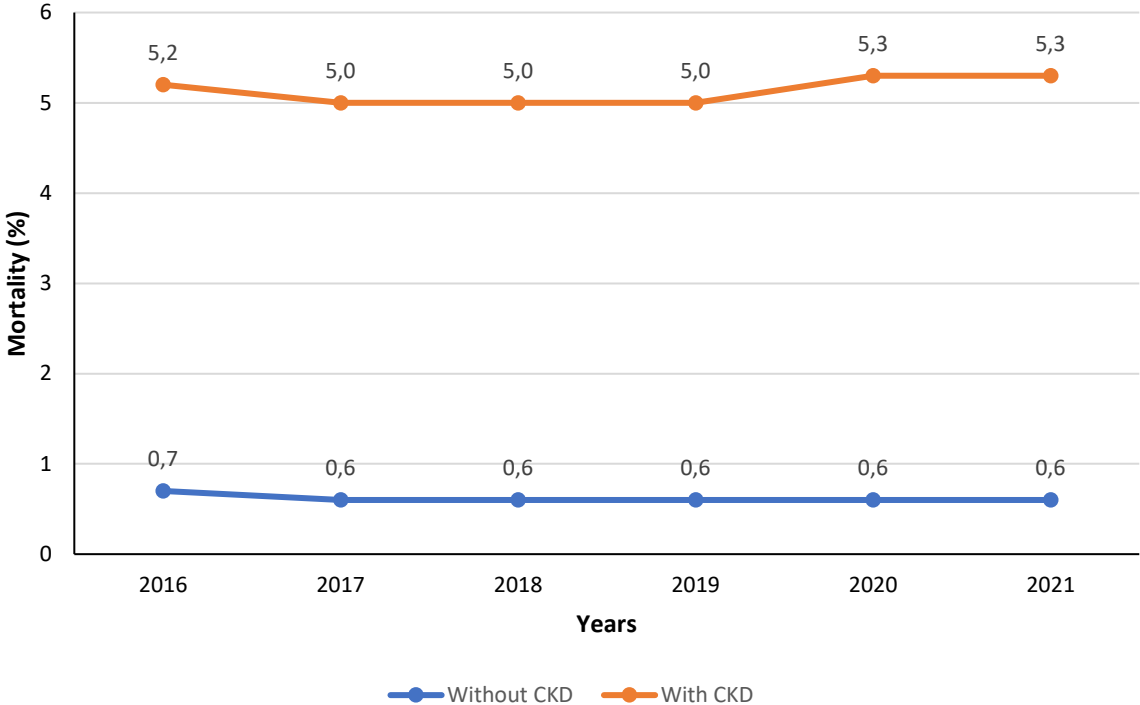
CKD=chronic kidney disease, gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

Higher prescriptions of one or more antihypertensive medication(s) in people with hypertension and chronic kidney disease compared with people with hypertension without known chronic kidney disease were observed across people of either sex or people of different age groups, regions, and income levels in all years examined. The prescription of one or more antihypertensive medication(s) was comparable between males and females while was higher in older people in people of both groups, i.e., people with hypertension with or without known chronic kidney disease.

Chapter 5: Mortality

Figure 5.1: Percentage of people with chronic kidney disease dying each year among adults (people 18 years and older) registered in Nivel primary care database (2016-2021)



In all years, mortality was substantially higher in people with chronic kidney disease. In 2016-2019, every year, about 5.0% of people with chronic kidney disease died, while in 2020 and 2021 (during the COVID-19 pandemic), about 5.3% died. In people with no known chronic kidney disease, every year between 2016-2021, about 0.6% died.

Table 5.1: Percentage of people with chronic kidney disease dying each year by risk classes of the disease (2016-2021)

Risk classes	2016	2017	2018	2019	2020	2021
Mild	2.3	2.2	2.5	2.5	2.8	2.8
Moderate	4.4	4.6	4.7	4.5	5.3	4.8
Severe	12.5	13.3	12.5	12.8	13.6	14.0
Unknown	6.3	5.8	5.6	6.0	6.1	6.2

Throughout the period between 2016 and 2021, mortality was highest in people with severe chronic kidney disease. Mortality in people with unknown risk class chronic kidney disease was higher than that of people with mild or moderate chronic kidney disease. In 2021, mortality was 2.8%, 4.8%, 14.0%, and 6.2% in people with mild chronic kidney disease, moderate chronic kidney disease, severe chronic kidney disease, and unknown risk class chronic kidney disease, respectively.

Table 5.2: Percentage of people with chronic kidney disease dying each year by sex, age groups, regions, and income levels (2016-2021)

	Category	2016	2017	2018	2019	2020	2021
Sex							
-CKD	Males	5.9	5.5	5.4	5.7	6.0	6.1
	Females	4.7	4.7	4.6	4.4	4.8	4.7
-No CKD	Males	0.8	0.7	0.6	0.6	0.6	0.7
	Females	0.6	0.6	0.5	0.5	0.5	0.5
Age groups							
-CKD	18-54	1.0	0.8	0.6	0.9	0.8	0.9
	55-75	2.1	2.1	2.0	2.3	2.3	2.4
	75+	8.1	7.9	7.9	7.7	8.2	8.1
-No CKD	18-54	0.1	0.1	0.1	0.1	0.1	0.1
	55-75	0.9	0.8	0.8	0.8	0.8	0.8
	75+	5.0	4.6	4.3	3.9	4.2	4.1
Regions							
-CKD	North (gr fr dr)	5.3	5.6	5.5	5.4	5.0	5.4
	East (ov gl fl)	5.1	4.8	4.8	5.3	5.5	5.6
	West (ut nh zh)	5.3	5.1	5.0	4.9	5.1	5.1
	South (zl nb lb)	5.3	5.0	4.6	4.6	5.8	5.5
-No CKD	North (gr fr dr)	0.8	0.7	0.7	0.6	0.6	0.7
	East (ov gl fl)	0.7	0.6	0.6	0.6	0.6	0.6
	West (ut nh zh)	0.7	0.6	0.5	0.5	0.5	0.5
	South (zl nb lb)	0.7	0.7	0.6	0.6	0.6	0.7
Income							
-CKD	1 st Quintile	11.7	11.2	10.5	10.1	12.9	10.7
	2 nd Quintile	3.5	3.5	3.4	3.6	3.3	3.8
	3 rd Quintile	3.5	3.0	3.1	3.2	2.6	3.4
	4 th Quintile	2.9	2.7	2.1	2.8	2.1	2.8
	5 th Quintile	2.5	2.5	2.5	2.4	2.0	2.6
	Institutional/Unknown	20.2	20.9	21.5	21.2	23.2	21.3
-No CKD	1 st Quintile	1.7	1.6	1.5	1.4	1.8	1.4
	2 nd Quintile	0.9	0.8	0.7	0.7	0.8	0.8
	3 rd Quintile	0.5	0.4	0.4	0.4	0.4	0.4
	4 th Quintile	0.3	0.3	0.3	0.3	0.2	0.3
	5 th Quintile	0.3	0.2	0.2	0.2	0.2	0.2
	Institutional/Unknown	4.8	4.5	4.1	3.1	3.1	3.4

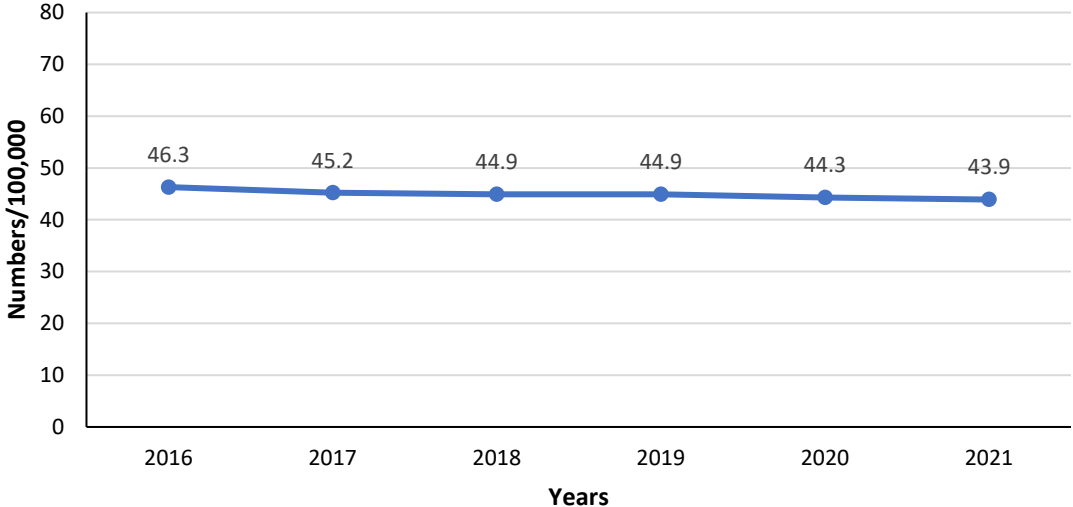
CKD=chronic kidney disease, gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

In all years, the percentage of people dying was higher in people with chronic kidney disease of any examined subgroup compared to their counterparts with no known chronic kidney disease. In people with chronic kidney disease each year, slightly more men died compared with women. In 2021, mortality was 6.1% in men and 4.7% in women in people with chronic kidney disease. Mortality was also higher in older people and those in lower income quintiles and the Institutional/Unknown category in both groups, i.e., with and without known chronic kidney disease.

Chapter 6: Renal replacement therapy

Figure 6.1: Number of people on dialysis per 100.000 people (18 years and older) (2016-2021)

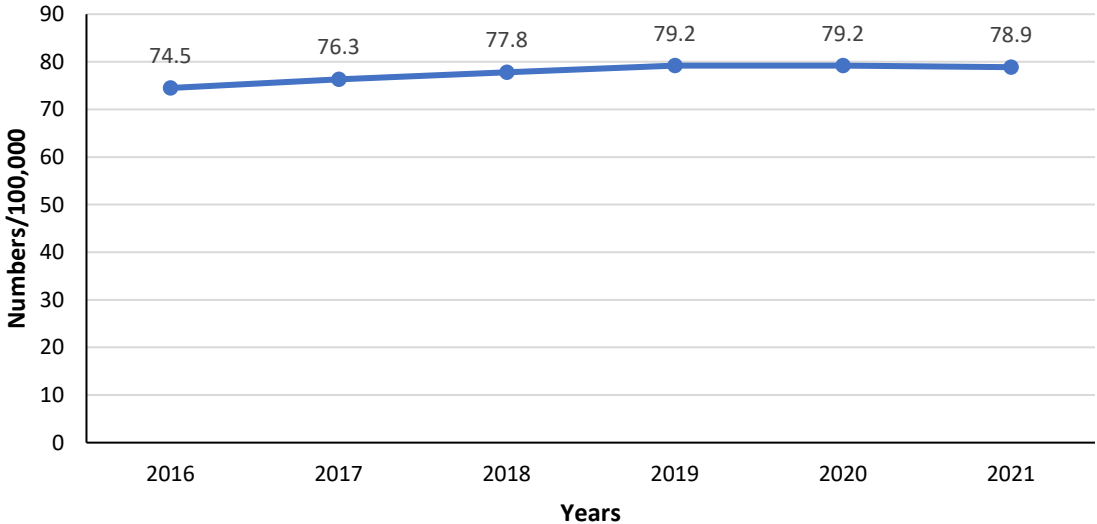


Between 2016 and 2021, about 45 people out of every 100.000 people aged 18 years and older were on dialysis.

Table 6.1: Total number of people on dialysis (18 years and older) (2016-2021)

	2016	2017	2018	2019	2020	2021
Total	6.334	6.242	6.247	6.316	6.272	6.271

Figure 6.2: Number of people living with functional kidney transplants per 100.000 people (18 years and older) (2016-2021)



Between 2016 and 2021, between 74 to 79 people out of every 100.000 people aged 18 years and older were living with functional kidney transplants.

Table 6.2: Total number of people living with functional kidney transplants (18 years and older) (2016-2021)

	2016	2017	2018	2019	2020	2021
Total	10.188	10.525	10.832	11.141	11.218	11.278

Future Perspective

As the risk factors for chronic kidney disease increase and the population ages, it is crucial to raise awareness and implement informed policies to combat this growing health issue. A key step in this process is gaining a better understanding of the burden of chronic kidney disease. To support this, the working group is committed to regularly reporting facts and figures about chronic kidney disease in the Netherlands.

Future reports will aim to provide a more comprehensive analysis of chronic kidney disease. This will include additional indicators of disease burden, such as loss of life years, loss of quality-adjusted life years, hospitalizations, and cost of care. Moreover, to assess the quality of care for people at risk of or living with chronic kidney disease, we will include data on the frequency of kidney function and albuminuria screenings, along with the quality of treatment indicators.

In addition to expanding the scope of disease burden and care quality indicators, future reports will present this data in more detail, such as also for people with different educational levels and migration backgrounds. We will also provide detailed information on life years lost, quality-adjusted life years, and mortality among people with chronic kidney disease by level of associated comorbidities. Importantly, to enable fairer comparisons between different groups—such as those from different regions or those with and without comorbidities—we will standardize for differences in age and sex.

The working group will also investigate additional data sources, such as recent epidemiological studies from various regions in the Netherlands and data from screening programs, to estimate and report the number of people with chronic kidney disease, both diagnosed and undiagnosed.

Methods

The presented numbers were calculated using data from the Netherlands Institute for Health Services Research Primary Care Database (Nivel PCD).¹ The Nivel collects longitudinal data that are routinely recorded by general practitioners (GPs), and processes these data into the Nivel-PCD. Nivel-PCD contains data on the number and type of contacts with the primary care physician, health conditions that are presented during these contacts, prescriptions, results of laboratory tests, measurements, and referrals to secondary care. Currently, data are collected from a dynamic cohort of approximately 500 practices (representing about 10% of all Dutch practices) spread throughout the Netherlands. Almost all Dutch inhabitants are registered with a primary care physician.

This study has been approved according to the governance code of the Nivel-PCD, under number NZR-00324.004. The use of electronic health records for research purposes is allowed under certain conditions. When these conditions are fulfilled, neither obtaining informed consent from people nor approval by a medical ethics committee is obligatory for this type of observational study containing no directly identifiable data (art. 24 GDPR Implementation Act jo art. 9.2 sub j GDPR).

For each year of 2016 up to 2021, people 18 years and older who had been registered in Nivel-PCD for at least two years were selected to ensure sufficient medical history for the identification of chronic kidney disease. Data from Nivel-PCD were linked on BSN by a trusted third party to data on household income, hospital data, and mortality available within the secure environment of Statistics Netherlands (CBS). Appendices 1 to 3 present the overview of the people analyzed each year for different indicators of disease burden.

Chronic kidney disease was identified using ICPC codes as registered by the GPs, and laboratory data on the estimated glomerular filtration rate and urinary albumin-to-creatinine ratio available in Nivel-PCD data (Box 6.1). Those with ICPC codes U99.01, U99.02, and U99.03 were classified as having chronic kidney disease. Because the ICPC code for chronic kidney disease diagnosis is not always recorded with a subcode, people with a U99 code and a high risk of chronic kidney disease (i.e., those with diabetes, hypertension, or those aged ≥ 70 years) were classified as having chronic kidney disease. People with estimated glomerular filtration rate < 60 min/min/1.73m² or urinary albumin to creatinine ratio ≥ 30 mg/g on two occasions at least 90 days apart were also classified as having chronic kidney disease. eGFR was estimated using the CKD-EPI 2009 equation where possible.² When possible, based on the most recent eGFR or UACR measurement, the risk classes of chronic kidney diseases were determined according to Kidney Disease Improving Global Outcomes (KDIGO) criteria.³ The number of people with chronic kidney disease not identified in primary care but managed in secondary care was obtained from Vektis data, claims data from health care insurers. The codes used to identify chronic kidney disease are presented in Appendix 4. The number of people on dialysis and kidney transplants was obtained from Nefrodata and presented separately.⁴

Kidney function deteriorates with age. There have been suggestions to consider this decline as a 'normal' part of aging and to establish age-specific cut-offs for classifying chronic kidney disease.^{5,6} However, this remains a matter of debate,⁷ and age-specific cut-offs have not yet been established. This is partly due to the increased risk of complications associated with decreased kidney function and elevated albuminuria across all age groups.⁸ This report utilized KDIGO-recommended criteria for the classification of chronic kidney disease.³

Yearly prevalence and incidence were reported for the overall population and key subgroups according to age, sex, region, and household income. Prevalence for a given year was reported as the percentage of people with chronic kidney disease on December 31st of that year. Incidence was

reported as the percentage of people newly identified with chronic kidney disease between January 1st and December 31st of a given year in people without known chronic kidney disease on January 1st of that year. Diabetes, hypertension and heart failure were defined using ICPC codes (T90, K86/K87 and K77, respectively). Data on the prescription of antihyperglycemic medication was based on ATC codes (A10A/A10B) present within Nivel-PCD data. The percentage of people with one or more prescriptions of antihyperglycemic medication(s) in people with diabetes mellitus was calculated separately for people with and without known chronic kidney disease. Similarly, the percentage of people with one or more prescriptions of antihypertensive medication(s) (ATC C02/C03/C07/C08/C09) in people with hypertension was calculated separately for people with and without known chronic kidney disease. All-cause mortality data was obtained from CBS and was reported for people with chronic kidney disease and those not classified as chronic kidney disease. Reported percentages are not standardized for possible differences in age, sex, and/or comorbidities between groups.

Box 6.1: Chronic kidney disease definition

ICPC codes:

- U99.01, U99.02, U99.03
- In those without a subcode for U99, use U99 + risk factors (including age \geq 70 years or presence of one or more comorbidities, including diabetes, hypertension, and heart failure)

eGFR/UACR (i.e., albuminuria) values:

- Two values of eGFR <60 ml/min/1.73m² and/or UACR ≥ 30 mg/g at least three months apart
- Therefore, at least two values of eGFR/UACR are needed when determining the presence of chronic kidney disease
- In case of availability of more than two values,
 - use the most recent values for diagnosis
 - In case of conflicting results based on two recent values, use the third most recent value for confirmation.

Conflicting diagnosis based on ICPC codes and eGFR/UACR values

- Classified as having chronic kidney disease based on ICPC codes unless
 - Both eGFR/UACR values were ≥ 60 / <30 and
 - One measurement was made less than three months prior, or measurements were made any time after the recording of the ICPC code

Chronic kidney disease diagnosis based on behandelcode from VEKTIS data

- 0313.11.324 'chronic renal insufficiency eGFR 30–60 mL/min/1.73 m²' and/or
- 0313.11.325 'chronic renal insufficiency eGFR <30 mL/min/1.73 m²'

ICPC= International Classification of Primary Care; eGFR=estimated glomerular filtration rate, UACR=urinary albumin creatinine ratio

References:

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Appendices

Appendix 1: Overall study population

	2016	2017	2018	2019	2020	2021
Study population	697,866	765,586	685,425	889,531	793,705	852,084
Sex						
– Females	354,328	389,648	349,667	452,015	404,078	434,026
– Males	343,538	375,938	335,758	437,516	389,627	418,058
Age groups						
– 18-54	403,667	443,684	395,555	507,471	452,598	485,069
– 55-74	223,898	245,173	220,757	289,712	258,260	277,545
– 75+	70,301	76,729	69,113	92,348	82,847	89,470
Regions						
– North (gr fr dr)	92,103	96,849	99,558	124,995	90,719	99,946
– East (ov gl fl)	146,997	155,975	131,863	212,615	212,615	202,220
– West (ut nh zh)	308,217	359,692	331,320	389,814	389,814	390,774
– South (zl nb lb)	150,549	153,070	122,684	163,107	162,107	159,144
Income levels*						
– Quintile 1	91,155	105,943	98,409	123,301	112,547	122,247
– Quintile 2	127,865	139,792	123,191	158,486	139,772	150,144
– Quintile 3	147,645	158,506	139,142	183,106	159,935	171,490
– Quintile 4	159,981	172,948	153,453	202,438	178,652	190,341
– Quintile 5	159,471	176,852	161,191	210,151	192,100	206,767
– Institutional/Unknown	11,749	11,545	10,039	12,049	10,699	11,095

gr=Groningen, fr=Friesland, dr=Drenthe, ov=Overijssel, gl=Gelderland, fl=Flevoland, ut=Utrecht, nh=Noord-Holland, zh=Zuid-Holland, zl=Zeeland, nb=Noord-Brabant, lb=Limburg

(1st quintile=lowest 20%, 2nd quintile=between 20th and 40th percentiles, 3rd quintile=between 40th and 60th percentiles, 4th quintile=between 60th and 80th percentiles, 5th quintile=highest 20%, Institutional/Unknown=People for whom third parties provide housing/daily necessities (e.g., nursing home residents) or people with unknown household income)

*Household income cut-off for quintiles by years (in euros)

Total	2016	2017	2018	2019	2020	2021
20e percentile	16,800	17,200	17,600	18,400	19,000	19,800
40e percentile	22,200	22,700	23,200	24,300	25,300	26,400
60e percentile	28,400	29,000	29,500	31,000	32,200	33,700
80e percentile	36,600	37,400	37,800	39,700	41,300	43,200

Source: [StatLine - Welvaart; grenzen van 10%-groepen inkomen & vermogen \(cbs.nl\)](#)

Appendix 2: Study population for comorbidities and mortality

Total	2016	2017	2018	2019	2020	2021
With CKD	43,268	55,097	53,553	72,863	66,402	72,485
Without CKD	654,598	710,489	631,872	816,668	727,303	779,599

CKD= chronic kidney disease

Appendix 3: Study population for treatment

Total	2016	2017	2018	2019	2020	2021
With CKD and with DM	16,469	18,864	16,887	22,480	19,647	20,955
Without CKD and with DM	42,126	46,111	40,991	52,950	47,364	50,635
With CKD and with HT	29,973	34,732	31,741	42,519	37,337	39,609
Without CKD and with HT	118,511	127,584	111,702	145,289	129,024	136,237

CKD= chronic kidney disease, DM=diabetes mellitus, HT=hypertension

Appendix 4: Selection of codes used to identify people with chronic kidney disease

Specialism-treatment code/activity code	Title
313-03-000-0324	Chronic kidney disease eGFR 30-60 ml/min
313-03-000-0325	Chronic kidney disease eGFR <30 ml/min

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