

Chapter 4 - Prevalence

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The provincial and national prevalence rates for Iraq were calculated using a combination of the following:

1. Completed IRTR records for kidney transplant patients receiving immunosuppressive medication disbursements through government-run provincial health centers.
2. Estimates of the number of patients receiving such medications, provided to the registry staff by provincial health centers at the start of IRTR implementation.
3. Population estimates based on United Nations datasets.

Based on these records, there are an estimated 5,090 surviving kidney transplant patients in Iraq through December 2019.

This prevalence estimate is underreported, as comprehensive data on transplant recipients for the whole of Iraq remains incomplete. At this point of the IRTR evolution, it is possible to assess the prevalence of treated transplant patients based on complete registry records in 10 of Iraq's 18 provinces and based on estimates for immunosuppressive drug usage in 5 provinces. Prevalence in the remaining three provinces (Al-Anbar, Salahuddin, and Kirkuk) remains unknown due to the fluid security conditions. As noted in the previous chapter, there may be several hundred additional transplant recipients in these provinces whose records were not included in the prevalence projections presented here.

A national prevalence rate was calculated using a population-basis inclusive of provinces where prevalence estimates were available, and excluding the populations of Al-Anbar, Salahuddin, and Kirkuk.¹ A national prevalence rate of 146.2 per million population was ascertained for 15 provinces of Iraq, which represent about 88% of the population.

¹ For prevalence calculations, we utilized a population estimate based on a mid-year projection made by United Nations Department of Economic and Social Affairs researchers. The UN dataset estimated Iraq's mid-2019 population at 39,310,000, with a 2.32% growth rate through 2020. United Nations Department of Economic and Social Affairs (2019). World Population Prospects: Total Population – Both Sexes. Retrieved from [https://population.un.org/wpp/Download/Files/1_Indicators%20\(Standard\)/EXCEL_FILES/1_Population/WPP2019_POP_F01_1_TOTAL_POPULATION_BOTH_SEXES.xlsx](https://population.un.org/wpp/Download/Files/1_Indicators%20(Standard)/EXCEL_FILES/1_Population/WPP2019_POP_F01_1_TOTAL_POPULATION_BOTH_SEXES.xlsx).

Within the 10 provinces that had complete IRTR records, there was a confirmed prevalence of 3,019 transplant patients, with a prevalence rate of 119.2/1,000,000. Within provinces where only drug usage estimates were available, there was a reported prevalence of 2,071 transplant patients and a transplant rate of 218.1/1,000,000. Meanwhile, there is no prevalence data for the provinces of Al-Anbar, Kirkuk, and Salahuddin, which have a combined population of about 5.2 million (approximately 13% of the national population).

Table 2 reports national prevalence data and disaggregated data for northern Iraq and provinces based on their completion of IRTR records.

Table 2 - Iraqi national prevalence data by regional groupings.

Region	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
All Iraq	39,752,283	N/A	N/A	N/A	N/A
All Iraq (excluding the North region & Al-Anbar)	35,925,826	3,023	2,927	96.6	119.6
All Iraq (excluding Al-Anbar, Kirkuk, & Salahuddin)	26,030,001	5,090	3,668	72.1	146.2
North (excluding Kirkuk & Salahuddin)	9,895,825	2,060	741	36	216.9
Provinces with complete IRTR records	26,031,074	3,019	3,019	100	119.2
Provinces where prevalence estimates were used	9,894,752	1,903	649	31.3	218.1

Data for the northern region has been disaggregated because the health care system in the provinces of Erbil, Sulaymanya, and Duhok are overseen by the autonomous Kurdistan Regional Governorate. The Kurdistan Ministry of Health has unique regulatory guidelines that have made its hospitals a hub for kidney transplantation for residents from other parts of the country, likely contributing to the region's substantially higher prevalence rate of 216.9/1,000,000 compared to the rest of the country (119.6/1,000,000). These factors necessitate a concurrent analysis of regional and national data.

Regional variations in prevalence

Within Iraq, there was variation in prevalence of transplants by province. The highest rates were found among provinces in the northern

region (between 66.5 to 375.8 per million), while lower rates were found in southern provinces (between 46.9 to 96 per million).

Table 3 reports the prevalence data for the Baghdad region, including Baghdad and Diyala. As Iraq's most populous region, Baghdad had a prevalence rate of 154.4 transplants per million, which was the highest outside of northern Iraq. Further, hospital participation in the registry was high in the region, with 99% of the projected number of transplant patients verified by the registry.

Table 3 – Prevalence data for Baghdad region.

Region	Province	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
Baghdad	Baghdad	8,567,663	1,419	1,419	100	165.6
	Diyala	1,709,825	168	153	91.1	98.3
Regional Subtotals		10,277,488	1,587	1,572	99.1	154.4

Table 4 reports the prevalence data for the Central region of Iraq, including Najaf, Diwaneya, Babil, Karbala, and Wassit. Overall, the prevalence rate for Central Iraq was reported at 111.3 transplant recipients per million population. Provinces in the region had a wide variation in prevalence, reporting between 48.1/1,000,000 and 149.5/1,000,000. This variation is likely due to the mix of urban, suburban, and rural provinces, with rural provinces having lower prevalence rates than urban areas, such as Najaf and Karbala. The Central region actively participated in the registry, reporting 100 percent of projected transplant patients.

Table 4 – Prevalence data for Central region.

Region	Province	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
Central	Najaf	1,545,022	231	231	100	149.5
	Al-Qadisiyyah	1,350,349	65	65	100	48.1
	Babil	2,155,821	262	262	100	121.5
	Karbala	1,278,248	176	176	100	137.7
	Wassit	1,443,051	131	131	100	90.8
Regional Subtotals		7,772,492	865	865	100	111.3

Table 5 reports prevalence data for the southern region of Iraq. The South is Iraq's least populous region and had the lowest prevalence rate (79.5/1,000,000). Prevalence rates in these provinces ranged from 46.9/1,000,000 in Thiqr to 96/1,000,000 in Basra. Registry participation in the region was slightly lower than in the Baghdad and Central regions, with only 84.8 percent of transplant recipients having their information entered in the registry, basically due to minimal participation in the Thiqr province.

Table 5 – Prevalence data for South region.

Region	Province	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
South	Basra	3,061,204	294	294	100	96.0
	Maysan	1,168,037	103	103	100	88.2
	Thiqr	2,195,992	103	15	14.6	46.9
	Al Muthanna	848,732	78	78	100	91.9
Regional Subtotals		7,273,965	578	490	84.8	79.5

Table 6 reports prevalence data for the northern region. As mentioned earlier, prevalence rates in this region were considerably higher than in the rest of Iraq, with a report 216.9 transplant recipients per million population. In fact, this rate was lowered by the inclusion of Nineweh province, which is not part of Kurdistan and was under ISIS occupation for 3 years. Excluding Nineweh, the prevalence rate for the three Kurdistan provinces combined, based on projected numbers from immunosuppressive drugs usage jumps to 322.1 per one million population.

This region was distinct in that reporting to the registry was lower, with only 36 percent of projected patients having their information entered into the database. Moreover, information on transplant recipients from Kirkuk and Salahuddin provinces is unavailable. Thus, population data for the two provinces were excluded from the regional and national analysis conducted for this report.

The low prevalence in the Nineweh province may be due to the fact that a large segment of the province's population continues to be displaced to other parts of the country and receive their medications at the locations they sought refuge at.

Table 6 – Prevalence data for North region.

Region	Province	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
North	Nineweh	3,906,846	260	260	100	63.9
	Erbil	1,952,908	734	180	24.5	360.7
	Sulaymaneya	2,278,393	605	0	0	254.8
	Duhok	1,357,560	461	301	65.3	325.8
	Kirkuk*	1,674,804	N/A	N/A	0	N/A
	Salahuddin*	1,663,474	N/A	N/A	0	N/A
Regional Subtotals		9,495,707	2,060	741	36	216.9
Excluding Nineweh		5,588,861	1,800	481	26.7	322.1

* provincial data unavailable due to security situation

Table 7 below highlights the prevalence data for provinces that suffered from population displacement. It is possible that most patients from those provinces continue to receive their medications elsewhere in the country, and may be included in the registry records of other provinces.

Table 7 – Prevalence data for provinces affected by population displacement.

Province	Estimated Population	Projected # Patients	Reported # Patients	% Reported	Prevalence Rate (per million)
Diyala	1,709,825	168	153	91.1	98.3
Kirkuk*	1,674,804	N/A	N/A	0	N/A
Nineweh	3,906,846	260	260	100	63.9
Salahuddin*	1,663,474	N/A	N/A	0	N/A

Urban vs. Rural

There were observable differences in prevalence rates among provinces with major cities outside of the Kurdistan provinces. Baghdad had the highest prevalence rate (165.6/1,000,000), with Najaf (149.5/1,000,000), Karbala (137.7/1,000,000), and Babil (121.5/1,000,000) ranging slightly lower. Meanwhile, mostly suburban provinces had lower prevalence rates, as evident in Al

Muthanna (91.9/1,000,000), Maysan (88.2/1,000,000), Nineweh (63.9/1,000,000), and Wassit (90.8/1,000,000). Mostly rural provinces had the lowest prevalence rates as evident in Thiqr and Qadisiyyah at 46.9 and 48.1 per million population respectively.

This trend reflects the greater access to tertiary care available to residents in Iraq's urban centers. Table 8 presents data on the difference found between urban and rural provinces.

Table 8 – Prevalence data comparing urban and rural provinces.

Region	Province	Estimated Population	Projected # Patients	Reported # Patients
Urban	Baghdad	8,567,663	1,419	165.6
	Babil	2,155,821	262	121.5
	Karbala	1,278,248	176	137.7
	Najaf	1,545,022	231	149.5
Suburban	Al Muthanna	848,732	78	91.9
	Maysan	1,168,037	103	88.2
	Nineweh	3,906,846	260	63.9
	Wassit	1,443,051	131	90.8
Rural	Thiqr	2,195,992	103	46.9
	Qadisiyyah	1,350,349	65	48.1

Gender

Prevalence data by gender was only available for transplant records confirmed by the registry, with results aggregated by region. There were 1,011 prevalent female transplant patients recorded by the registry, with a national female prevalence rate of 29/1,000,000. The prevalence rate is depressed by approximately 30% due to the lack of patient records, primarily in the Kurdistan provinces. The region with the greatest proportion of female transplant recipients was the North (31%), while the lowest was the southern region (24%). Table 9 on the next page reports female kidney transplant prevalence data across the country.

Table 9 – Female kidney transplant national prevalence data.

Province	Estimated Population	Reported # Patients	Total Female	% Female	Female Prevalence Rate (per million)
Baghdad	10,277,488	1,572	443	28.5	43.1
Central	7,772,492	865	223	25.8	28.7
South	7,273,965	490	117	24.2	16.1
North (excluding Kirkuk & Salahuddin)	9,495,707	741	228	30.8	24.0
All Iraq (excluding Kirkuk, Salahuddin, & Al-Anbar)	34,819,651	3,668	1,011	27.6	29.0

National prevalence reflection

The prevalence data highlighted by this report shows the continuing efforts of Iraqi nephrologists and health professionals to grapple with national ESRD needs. One of the successes of the registry has been to achieve nearly complete participation among government provincial hospitals outside of the Kurdish provinces. Achieving total national participation is a work in progress that will hopefully be accomplished in the coming years, as the registry continues to mature.

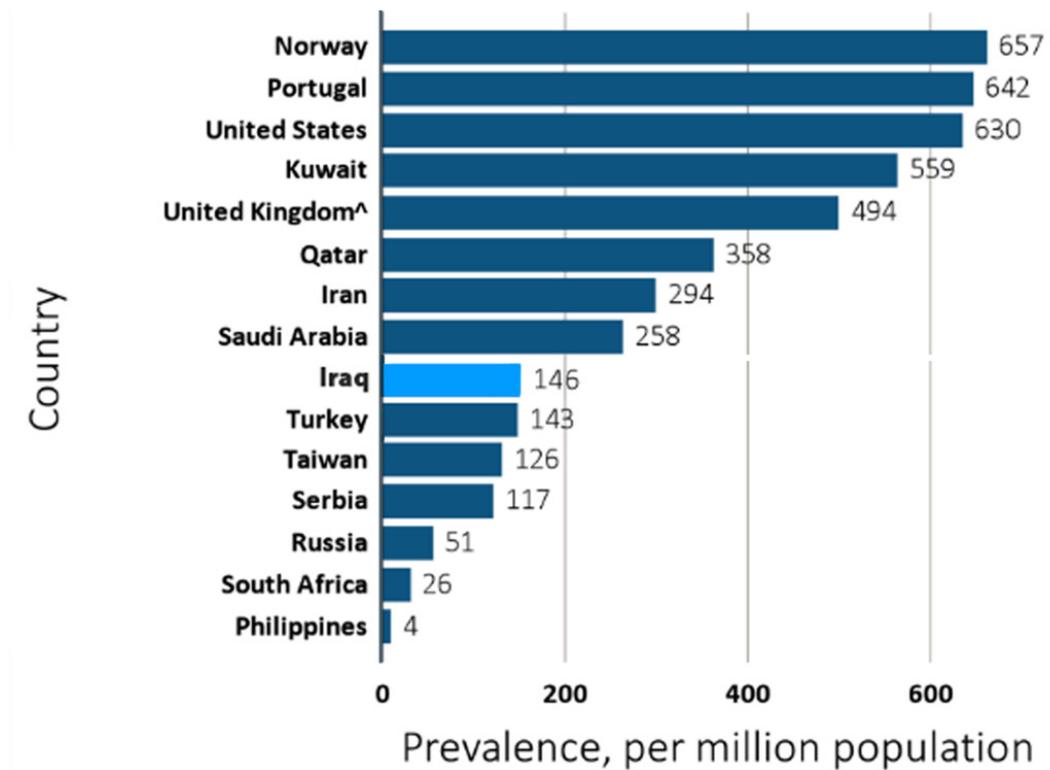
The great degree of regional variation in kidney transplant prevalence warrants further investigation and consideration. Specifically, prevalence rates in the Kurdistan provinces where reported data are between 150-600% greater than provinces in the rest of Iraq, suggests an unmet need and capacity deficiencies in other parts of the country. Based on prevalence rates, the greatest unmet needs appear to be in the country's rural provinces.

International Comparisons

According to data published in the 2016 USRDS Annual Report, Iraq has a lower transplant prevalence rate than many regional coun-

tries. While Iraq has a similar prevalence rate to nearby Turkey (143/1,000,000), Iraq's rate is substantially lower than neighboring Iran (294/1,000,000), Qatar (358/1,000,000), and Kuwait (559/1,000,000). Figure 4 offers an illustrated comparison of transplant rates found regionally and globally.

Figure 5 – International comparison of transplant prevalence rate per million population.³



² United States Renal Data System (2016). USRDS annual data report: Epidemiology of kidney disease in the United States. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases: Bethesda, MD.

³ Figure adapted from USRDS annual data report. All reported figures represent latest available data from 2016, excluding Iraq, which is updated to late 2019. Ibid.