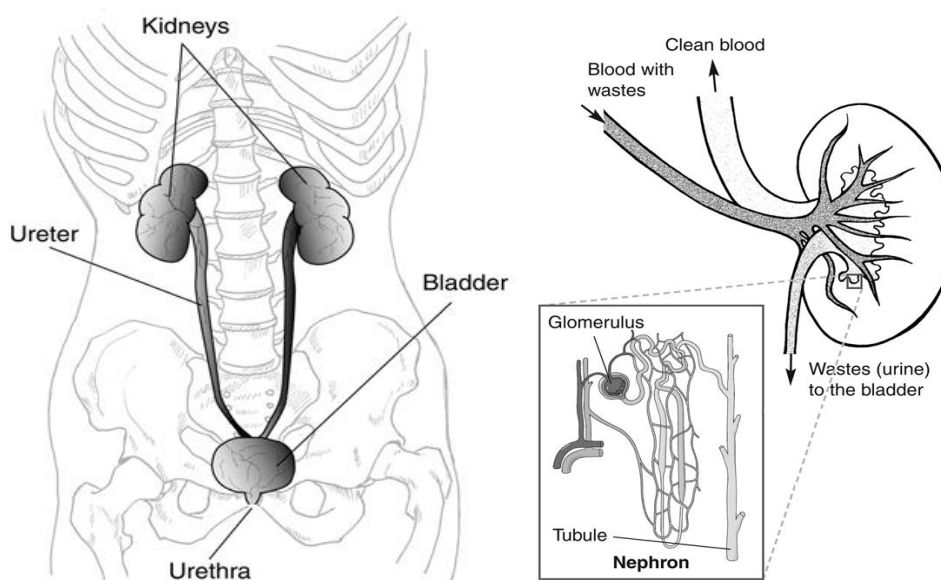


Trends of End Stage Renal Disease in Singapore

1. Introduction

- ❖ The kidneys, located deep in the abdomen below the rib cage, as shown in Figure 1, are responsible for several key functions. They remove toxins and waste from our blood. They also help to keep our bones healthy, control our blood pressure and produce red blood cells that carry oxygen to various parts of our bodies.
- ❖ Chronic kidney disease is a slow process where the kidneys gradually lose their ability to perform these functions. End-stage renal disease (ESRD) occurs when the kidneys fail to function properly, resulting in accumulation of waste products and toxic materials in the body. When this occurs, the affected person may experience fatigue, swelling of hands and feet, breathlessness, itching, nausea, loss of appetite etc.

Figure 1: Anatomy of the Urinary System¹



¹ National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Health.

2. New Patients with ESRD

- ❖ The number of new patients with ESRD increased from 680 in 1999 to 1405 in 2010.²
- ❖ The corresponding rate³ of new patients with ESRD has increased from 194 per million population (pmp) in 1999 to 267 pmp in 2010 (Table 1).

Table 1: New Patients with ESRD, 1999 – 2010

Year	ESRD		
	Number	CR *	ASR **
1999	680	210.5	193.7
2000	743	227.0	208.0
2001	786	236.3	211.5
2002	729	215.5	188.5
2003	854	253.7	220.3
2004	936	274.2	230.5
2005	1019	293.9	245.4
2006	1201	340.7	282.8
2007	1320	368.5	294.9
2008	1270	348.7	268.4
2009	1275	341.5	255.7
2010	1405	372.5	266.6

* CR: Crude rate per million population (pmp). The rates have not been age-standardised; and are derived from the number of ESRD cases divided by the number of Singapore residents multiplied by 1 million.

**ASR: Age-standardised rate (pmp)

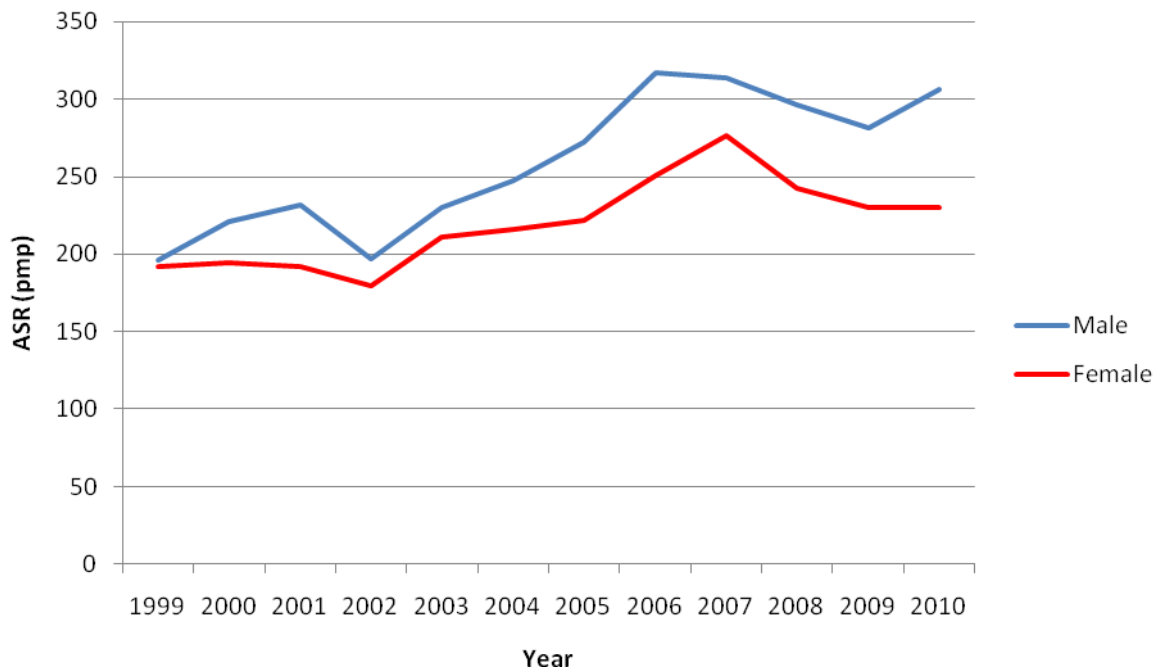
3. New cases of ESRD by Gender

- ❖ The rates of new ESRD patients were higher in men than in women.
- ❖ Among the men, the rates of new ESRD patients increased from 197 pmp in 1999 to 306 pmp in 2010, with a notable peak in 2006. Similarly, among the women, the corresponding rates increased from 192 pmp to 230 pmp in 2010, with a peak in 2007 (Fig. 2).

² From 2007 onwards, we have included CKD5 patients, i.e. those approaching ESRD. The CKD5 cases have contributed about 10% more cases to the ESRD counts.

³ All rates in this paper have been age-standardised to eliminate the effect of age on the results. For example, if the population in Singapore now is older than the population 20 years ago, the colorectal cancer incidence now is expected to be higher than that of 20 years ago because the risk of colorectal cancer increases with age. In age-standardisation, we compute the rate based on a reference age population. The World population has been used as been used as the reference population in this paper.

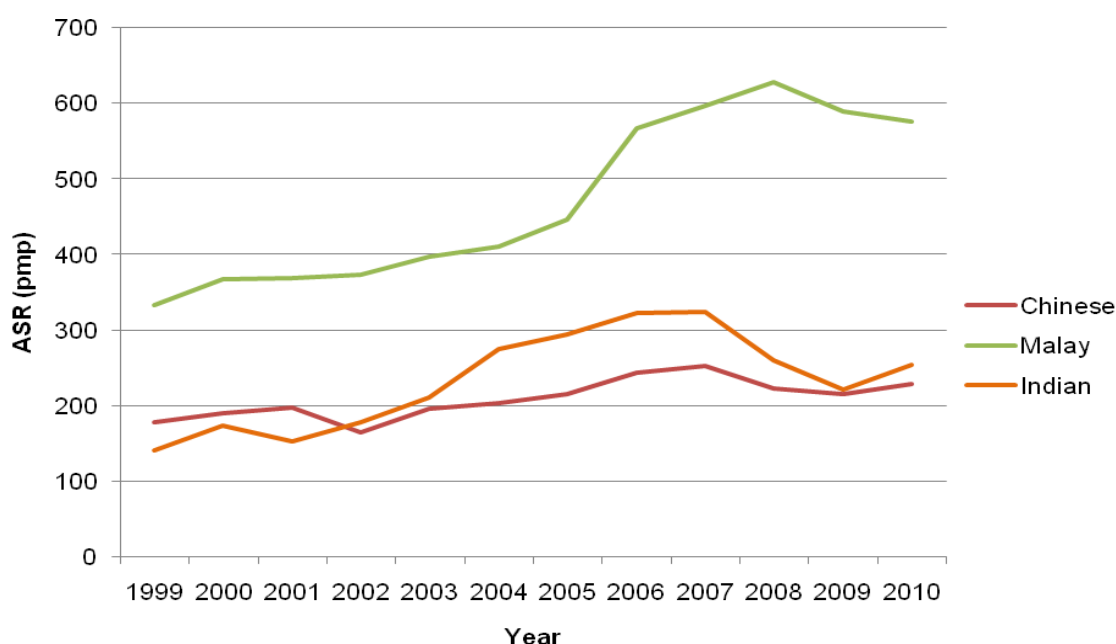
Figure 2: Rates of new ESRD Patients (age-standardised) by Gender, 1999-2010



4. New Patients with ESRD by Ethnic groups

- ❖ In year 2010, the rates of new patients with ESRD were highest among the Malays, followed by the Indians and Chinese (Fig. 3).

Figure 3: Rates of new ESRD patients by Ethnic Group, 1999-2010



5. New ESRD Patients who started on Dialysis

- ❖ The rates of new ESRD patients who started on dialysis increased from 176 pmp in 1999 to 176 pmp in 2010, with a notable peak in 2007 (Table 2).

Table 2: New Patients with ESRD who started on Dialysis

Year	No	CR *	ASR **
1999	618	191.3	176.1
2000	666	203.4	185.5
2001	711	213.8	192.1
2002	710	209.9	184.2
2003	683	202.9	175.5
2004	756	221.5	186.8
2005	833	240.2	201.0
2006	840	238.3	198.2
2007	950	265.2	211.8
2008	900	247.1	191.9
2009	850	227.7	176.3
2010	908	240.7	175.6

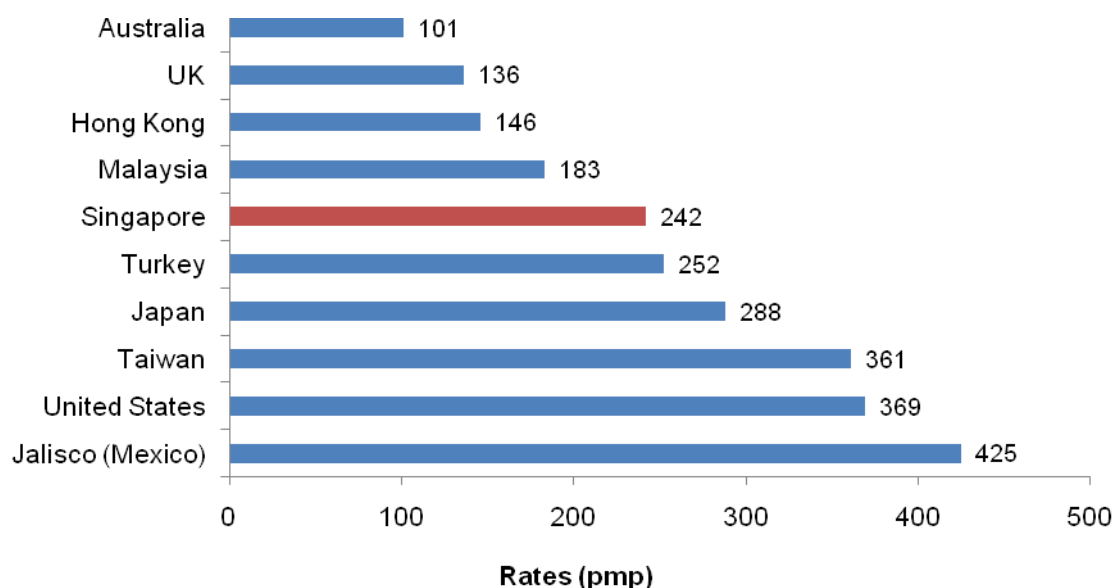
* CR: Crude rate per million population per year (pmp)

**ASR: Age-standardised rate (pmp)

6. International Comparisons of ESRD, 2010

- ❖ Globally, a high rate of new ESRD cases has been reported in Taiwan, Japan and the United States. Figure 4 shows the rate of new ESRD cases in the Singapore population as compared to other countries⁴.

Figure 4: Rate of new ESRD Patients - International comparisons, 2010



Note that crude rates have been presented. Only patients on haemodialysis, peritoneal dialysis and transplant are included in the numerator.

7. Existing Number of ESRD patients

- ❖ At the end of 2010, a total of 4,593 patients were on dialysis. This represents an 87% increase when compared with 1999.
- ❖ The rate of ESRD patients increased from 690 pmp in 1999 to 896 pmp in 2010 (Table 3).

⁴ U.S. Renal Data System, USRDS 2012 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the United States, National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 2012.

Table 3: Existing ESRD Patients on Dialysis

Year	Number	CR*	ASR **
1999	2460	761.6	689.9
2000	2756	841.9	745.8
2001	2984	897.1	786.8
2002	3197	944.9	812.1
2003	3298	979.6	832.9
2004	3407	998.1	827.8
2005	3565	1028.1	837.6
2006	3774	1070.5	863.7
2007	3943	1100.7	870.2
2008	4172	1145.3	883.8
2009	4379	1172.8	890.5
2010	4593	1217.8	895.8

* CR: Crude rate per million population per year (pmp)

**ASR: Age-standardised rate (pmp)

8. Proportion of Diabetics among new ESRD Patients

- ❖ Generally, the proportion of ESRD due to diabetes has been increasing.
- ❖ In 2010, 59.9% of the new ESRD patients in Singapore were diabetic.

Table 4: Proportion of Diabetics among New ESRD Patients, 1999-2010

Years	Diabetics (%)
1999	48.4
2000	48.7
2001	54.1
2002	53.2
2003	55.7
2004	55.0
2005	52.4
2006	58.5
2007	59.0
2008	61.7
2009	58.8
2010	59.9

9. Healthy lifestyle – key to preventing kidney failure

- ❖ Singapore has a high burden of Impaired Fasting Glucose (IFG) and Impaired Glucose Tolerance (IGT) with 12% of its population between the ages of 18 and 69⁵ with at least one of these conditions. Poorly controlled IFG/IGT is associated with an increased risk of developing diabetes.
- ❖ The Pre-diabetes Intervention Programme was developed by the Health Promotion Board to equip pre-diabetics with the necessary knowledge and skills to adopt lifestyle changes. Lifestyle changes, such as healthy eating and regular physical activity, can reduce the risk of developing diabetes.
- ❖ Early diagnosis, optimal treatment and lifestyle changes are necessary for good control of diabetes and for prevention or delay in the onset of serious complications such as renal failure. Lifestyle changes include maintaining a healthy weight by having a proper diet and engaging in regular physical activity, drinking alcohol in moderation and quitting smoking. Relevant information can be obtained at the Health Promotion Board's website (www.hpb.gov.sg).

⁵ National Health Survey 2004