

### What you need to know

- The number of new End-stage renal disease (ESRD) patients has nearly doubled from 1999 to 2008.
- Diabetes mellitus is the most common cause of ESRD
- Patients suffering from ESRD have increase risk of cardiovascular disease such as stroke, heart attack, heart failure.
- Lifestyle changes, control of risk factors such as diabetes mellitus, high blood pressure, early diagnosis and optimal treatment of kidney impairment can prevent the onset of ESRD.

### **OBJECTIVES**

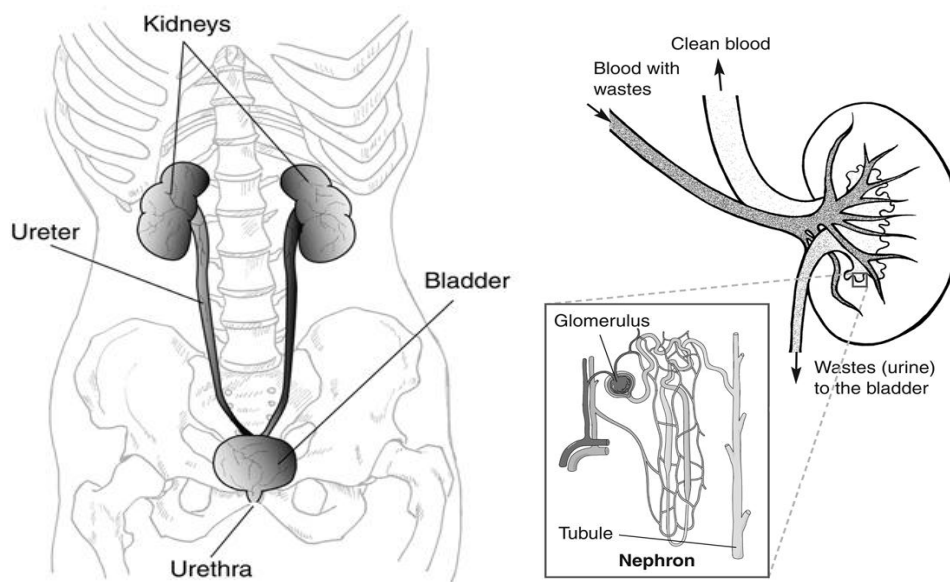
This paper aims to provide an overview of ESRD trends in Singapore, to raise awareness on the main causes of ESRD, the link between ESRD and cardiovascular disease and the preventive measures to reduce the risk of developing ESRD.

### **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, breathless, itch, nausea, loss of appetite etc.

**Figure 1: Anatomy of the Urinary System<sup>1</sup>**



**TRENDS IN ESRD**

Data from the Singapore Renal Registry shows that the number of new ESRD patients has increased from 680 in 1999 to 1,212 in 2008 with a notable peak in 2007. Correspondingly, the age-standardised incidence rates have increased from 193.7 per million population (pmp) in 1999 to 256.0 in 2008 as shown in Table 1.

**Table 1: Incidence of ESRD  
in Numbers, Crude Rates and Age-standardised Rates 1999-2008**

Year	Total	CR *	ASR **
1999	680	210.5	193.7
2000	743	227.0	208.0
2001	784	235.7	211.1
2002	729	215.5	188.5
2003	852	253.1	219.9
2004	934	273.6	229.9
2005	1013	292.1	244.1
2006	1198	339.8	281.9
2007	1308	365.1	292.4
2008	1212	332.7	256.0

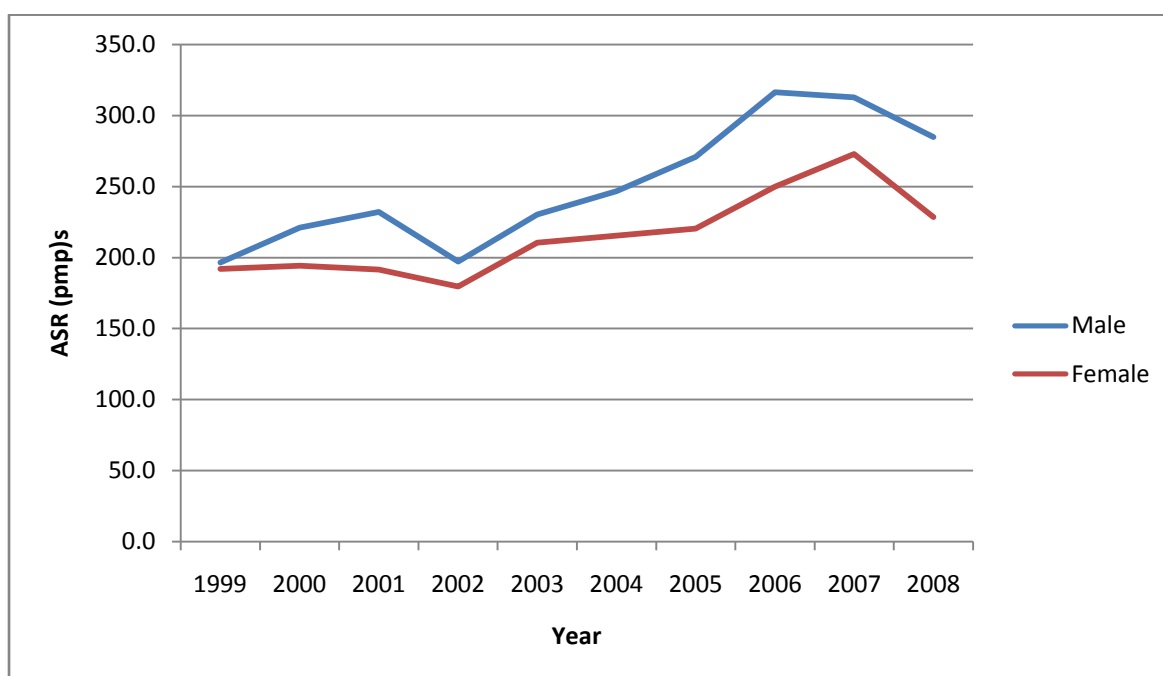
\* CR: Crude rate per million population per year (pmp)

\*\*ASR: age-standardised rate pmp

<sup>1</sup> National Institute of Diabetes and Digestive and Kidney Diseases, National Institute of Health.

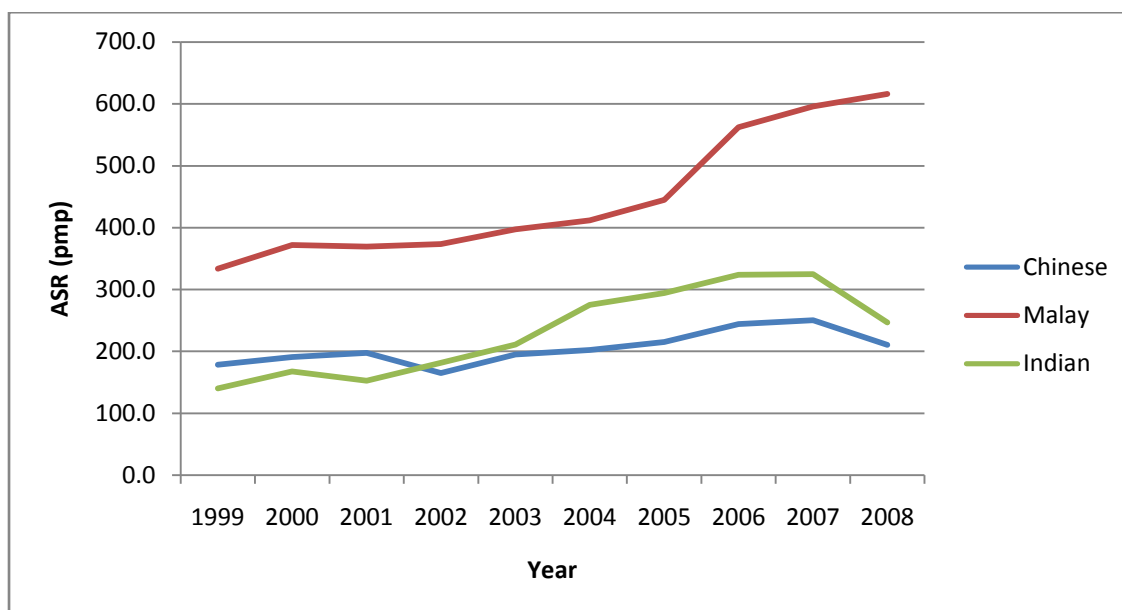
The age-standardised incidence rates of new ESRD cases were higher in men, increasing from 196.4 pmp in 1999 to 284.7 pmp in 2008. For women, the age-standardised incidence rates increased from 192.0 pmp in 1999 to 228.6 in 2008 (Chart 1).

**Chart 1: Age-standardised Incidence Rates of ESRD by Gender, 1999-2008**



Among the three ethnic groups, the age standardized incidence rates were highest in Malays as shown in Chart 2. The high incidence rates of ESRD in Malays and Indians could be attributed to high proportions of diabetics (about 70%) in these two ethnic groups.

**Chart 2: Age-standardised Incidence Rates of ESRD by Ethnic Group, 1999-2008**



An individual with kidneys that function below 15-20 % of their capacity will require dialysis or a kidney transplant.

Corresponding to the increase in ESRD incidence, the number of ESRD patients started on dialysis increased from 618 in 1999 to 895 in 2008, with a notable peak in 2007, as shown in Table 2.

**Table 2: Incidence of ESRD started on dialysis**  
**Shown in numbers, crude rates and age standardised rates, 1999-2008**

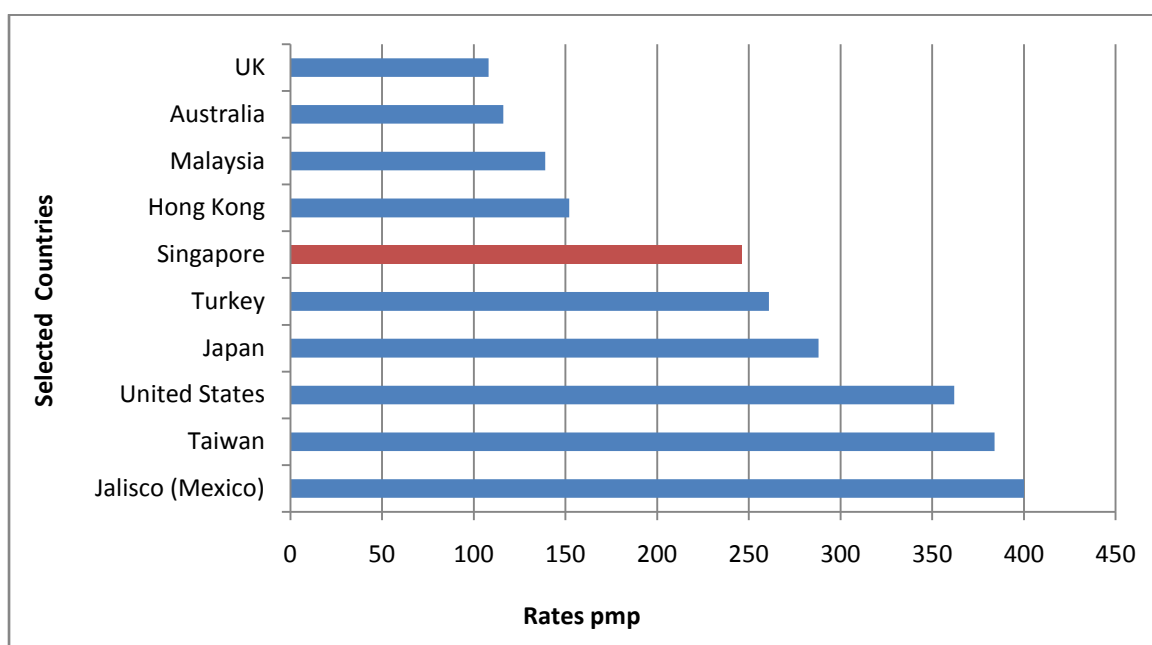
Year	No	CR *	ASR **
1999	618	191.3	176.1
2000	666	203.4	185.5
2001	709	213.1	191.7
2002	710	209.9	184.2
2003	682	202.6	175.3
2004	756	221.5	186.8
2005	832	239.9	200.8
2006	840	238.3	198.2
2007	947	264.4	211.0
2008	895	245.7	190.5

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

\*\*ASR: age-standardised rate pmp

Globally, a high incidence of ESRD has been reported in Taiwan, the United States and Mexico (Jalisco). These countries have also treated a high proportion of diabetic ESRD patients. Chart 3 shows the incidence of ESRD in the Singapore population as compared to other countries<sup>2</sup>.

**Chart 3: Incidence of ESRD: International comparisons, 2008.**



In total there were 4169 patients (prevalence) on dialysis at the end of 2008. This represents a 69.5% increase when compared with 1999. The age standardized prevalence rates increased from 689.7 pmp in 1999 to 883.0 pmp in 2008. (Table 3).

<sup>2</sup> U.S. Renal Data System, USRDS 2010 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, 2010.

Table 3: Prevalence (current cases) of ESRD on dialysis  
Shown in numbers, crude rates and age standardised rates, 1999-2008

Year	Total	CR *	ASR **
1999	2459	761.3	689.7
2000	2755	841.6	745.6
2001	2982	896.5	786.2
2002	3196	944.6	811.9
2003	3298	979.6	832.9
2004	3406	997.8	827.5
2005	3564	1027.8	837.4
2006	3773	1070.2	863.5
2007	3942	1100.4	870.0
2008	4169	1144.5	883.0

## CAUSES OF ESRD

Diabetes mellitus (Types 1 and 2) is the most common primary disease reported to cause ESRD. From 1999 to 2008, the proportion of ESRD due to diabetes mellitus has increased from 48.4% in 1999 to 62.4 % in 2008 as shown in Table 4. The other causes of ESRD include glomerulonephritis (inflammation of special blood vessels called glomeruli in the kidneys, contributing to about 20% of ESRD) and high blood pressure (contributing to about 10% of ESRD).

Table 4: Proportion of Diabetics among New ESRD cases, 1999-2008

Year	Diabetics (%)	Non-Diabetics (%)
1999	48.4	51.6
2000	48.7	51.3
2001	54.2	45.8
2002	53.2	46.8
2003	55.9	44.1
2004	55.1	44.9
2005	52.7	47.3
2006	58.5	41.5
2007	58.9	41.1
2008	62.4	37.6

The high proportion of Singapore's ESRD cases caused by diabetes mellitus is a reflection of international trends. Diabetes mellitus accounts for 30-50% of ESRD cases in most countries. For example, the proportion of new ESRD cases with diabetes mellitus in Malaysia, United States, Taiwan and Hong Kong were 58.5%, 43.9%, 43.1% and 45.1% respectively.<sup>3</sup>

People suffering from kidney failure may not be aware of it because the signs of kidney failure can be subtle, such as changes in urination, fatigue, itch, swelling of the hands or feet.

Impairment of kidney functions can be detected early through blood and urine tests; early detection of kidney impairment allows treatment to be instituted before the occurrence of kidney failure or cardiovascular disease that is associated with it.

Early detection of impairment of kidney functions through screening is particular important for patients who are suffering from diabetes and high blood pressure and individuals with family history of kidney diseases.

### **ASSOCIATION OF ESRD WITH CARDIOVASCULAR DISEASE**

Patients suffering from ESRD have 20 to 30 folds increase in risk of cardiovascular disease such as stroke, heart attack, heart failure. Patients with kidney failure have increased risk of dying from cardiovascular diseases.

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<sup>3</sup> International Comparisons. 2010 Annual Data Report (URDS 2010)

## **HEALTHY LIFESTYLE – KEY TO PREVENTING KIDNEY FAILURE**

Not only does kidney failure affect the quality of life, it is also a costly condition to treat. Living a healthy lifestyle, such as eating a healthy diet, keeping weight in check, not smoking, keeping fit and active and taking a pro-active approach to regular screening for those at risk of suffering from kidney disease can prevent kidney failure from affecting our lives.

The Health Promotion Board (HPB) has instituted programmes to promote healthier lifestyle among Singaporeans. Details on these programmes can be obtained on the Health Promotion Board's website ([www.hpb.gov.sg](http://www.hpb.gov.sg)).