Chronic Kidney Disease; Basic and Epidemiologic Features in Adult Population

Gültekin Süleymanlar, MD
Akdeniz University Medical School, Antalya
Presentation Plan

- Definition of Chronic Kidney Disease (CKD)
- Classification (Staging) of CKD
- Definition of end-stage renal disease (ESRD)
- Epidemiology of ESRD
- Epidemiology of CKD (including CREDIT)
- Conclusion
Chronic Kidney Disease; General Considerations

• Common and rapidly growing public health problem
• Has high morbidity and mortality
• Negatively affects the quality of life,
• Awareness and early diagnosis is unlikely
• Associated with big socio-economic burden
• However, it can be prevented or at least its progression can be delayed
Definition

Before 2002, vague and variable terminology, such as “chronic renal failure,” “chronic renal insufficiency,” “pre-dialysis,” and “pre-end-stage renal disease” prevented the use of a common and precise language.
In 2002 the National Kidney Foundation's Kidney Disease Outcomes Quality Initiative (KDOQI) published a guideline on CKD covering evaluation, classification, and stratification of risk.

The workgroup developing this guideline provided a new conceptual framework for a diagnosis of CKD independent of cause, and developed a classification scheme of kidney disease severity based on the level of glomerular filtration rate (GFR).

Definition

1. Kidney damage for $\geq 3$ months, as defined by structural or functional abnormalities of the kidney, with or without decreased GFR, manifest by *either*:
   - Pathological abnormalities; or
   - Markers of kidney damage, including abnormalities in the composition of the blood or urine, or abnormalities in imaging tests

2. GFR <60 mL/min/1.73 m$^2$ for $\geq 3$ months, with or without kidney damage

Am J Kidney Dis 2002; 39 (suppl 1): S1-S266.
## Stages of Chronic Kidney Disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>GFR (mL/ min/ 1.73 m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage with normal or ↑ GFR</td>
<td>≥90</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>60-89</td>
</tr>
<tr>
<td>3</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>30-59</td>
</tr>
<tr>
<td>4</td>
<td>Severe ↓ GFR</td>
<td>15-29</td>
</tr>
<tr>
<td>5</td>
<td>Kidney failure</td>
<td>&lt;15 (or dialysis)</td>
</tr>
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## Stages of Chronic Kidney Disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
<th>GFR (mL/ min / 1.73 m^2)</th>
<th>Classification by Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kidney damage with normal or ↑ GFR</td>
<td>≥90</td>
<td>T if kidney transplant recipient</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>60-89</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>30-59</td>
<td></td>
</tr>
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## Stages of Chronic Kidney Disease

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</tr>
<tr>
<td>2</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>89-60</td>
</tr>
<tr>
<td>3</td>
<td>Kidney damage with mild ↓ GFR</td>
<td>59-30</td>
</tr>
<tr>
<td></td>
<td><strong>3A</strong></td>
<td>59-45</td>
</tr>
<tr>
<td></td>
<td><strong>3B</strong></td>
<td>44-30</td>
</tr>
<tr>
<td>4</td>
<td>Severe ↓ GFR</td>
<td>29-15</td>
</tr>
<tr>
<td>5</td>
<td>Kidney failure</td>
<td>&lt;15 (or dialysis)</td>
</tr>
</tbody>
</table>

The suffix p to be added to the stage in proteinuric patients (proteinuria >0.5 g/day)
End Stage Renal Disease (CKD Stage V; Requiring RRT)
Comparison of unadjusted ESRD incidence & prevalence worldwide
All rates unadjusted. Data from Argentina (pre-2008), Brazil, Japan, Luxembourg, & Taiwan are dialysis only.

USRDS 2010
Counts of ESRD Patients Requiring RRT Worldwide

Dialysis patients # 1,550,000
Kidney Transplant patients # 470,000

Patient counts (in million)

Years

2000 2001 2002 2003 2004 2005 2006

RTx
Dialysis
Counts of Hemodialysis Patients (2009)

Annual Growth Rates of HD Patients

USA: %3 – 4
EU: %3 – 4
Japan: %2 – 3
Others: %10 – 11
Overall: %6 – 7

N: 1,692,000
Counts of Peritoneal Dialysis Patients (2009)

Annual Growth Rates of PD Patients

USA: % 1
EU: % 0
Japan: % – 3
Other: %10
General: %6 – 7

(APD = CAPD)

N:203,000
Counts of Dialysis Patients in Turkey
Counts of Kidney Transplant Recipients in Turkey

Yearly counts from 2000 to 2010, with a steady increase over time.

- 2000: 368
- 2001: 491
- 2002: 550
- 2003: 605
- 2004: 775
- 2005: 926
- 2006: 949
- 2007: 1302
- 2008: 1710
- 2009: 2362
- 2010: 2502
Rates (Incidence & Prevalence) of ESRD in Turkey, (pmp, by year)

(Per million population;pmp)
Next 10-Year Projection for Rates of ESRD Patients Requiring RRT in Turkey

From TSN Registry Reports

>100,000 ESRD Patients

Patient Counts

Time (Year)


0 20000 40000 60000 80000 100000 120000

0-12%↑

From TSN Registry Reports
Diabetes Mellitus as a Cause of ESRD by Countries (DOPPS 3, 2007)

<table>
<thead>
<tr>
<th>Country</th>
<th>%</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>35.5%</td>
<td>6,286</td>
</tr>
<tr>
<td>AusNZ</td>
<td>34.0%</td>
<td>200</td>
</tr>
<tr>
<td>Belgium</td>
<td>29.8%</td>
<td>251</td>
</tr>
<tr>
<td>Canada</td>
<td>39.4%</td>
<td>758</td>
</tr>
<tr>
<td>France</td>
<td>25.3%</td>
<td>247</td>
</tr>
<tr>
<td>Germany</td>
<td>31.7%</td>
<td>353</td>
</tr>
<tr>
<td>Italy</td>
<td>18.8%</td>
<td>146</td>
</tr>
<tr>
<td>Japan</td>
<td>31.5%</td>
<td>1,265</td>
</tr>
<tr>
<td>Spain</td>
<td>24.4%</td>
<td>269</td>
</tr>
<tr>
<td>Sweden</td>
<td>29.9%</td>
<td>162</td>
</tr>
<tr>
<td>UK</td>
<td>24.5%</td>
<td>230</td>
</tr>
<tr>
<td>US</td>
<td>50.0%</td>
<td>2,345</td>
</tr>
</tbody>
</table>

Total N: 17,725
Evolving Face of Primary Diagnosis of ESRD in Hemodialysis Patients in Turkey

![Bar chart showing the percentage of different primary diagnoses for ESRD over time (1995-2009). The diagnoses include DM, CGN, HT, UROLOGIC, CYSTIC KD, CTIN, OTHERS, and UNKNOWN. The chart indicates a trend of increasing percentage for DM and CGN over the years.]
Trends in Renal Replacement Therapy in Turkey, 1996-2008

Gültekin Süleymanlar, MD,¹ Kamil Serdengeçti, MD,² Mehmet R. Altiparmak, MD,²
Kitty Jager, MD, PhD,³ Nurhan Seyahi, MD,² and Ekrem Erek, MD,² on behalf of the
Turkish Registry of Nephrology, Dialysis, and Transplantation*

**Background:** National renal registry studies providing data for incidence, prevalence, and characteristics of end-stage renal disease and renal replacement therapy (RRT) serve as a basis to determine national strategies for the prevention and treatment of these diseases and identify new areas for special studies.

**Study Design:** Since 1990, the Turkish Society of Nephrology has been coordinating a national renal registry that collects data on patients receiving RRT. This report focuses on data collected from 1996-2008.

**Setting & Participants:** Data were collected in dialysis centers for patients on RRT.

**Predictor:** Year.

**Outcomes:** Point prevalence and incidence of RRT, RRT modalities, demographic and clinical characteristics of patients on RRT.

**Results:** From 1996 to 2008, the number of centers (199 and 760) and response rates to the registry (76% and 99.4%) increased. In 2008, the point prevalence of RRT was 756 per million population (pmp) and incidence was 188 pmp, including pediatric patients. In prevalent patients, the most common RRT modality was hemodialysis (77.0% of patients), followed by peritoneal dialysis (10.1%) and transplant (12.9%). The age of hemodialysis and transplant patients increased, with a predominance of male patients. Percentages of diabetes mellitus and hypertension as causes of ESRD increased, whereas those of chronic glomerulonephritis and urologic disease decreased. Infection and crude death rates decreased in all treatment modalities.

**Limitations:** The main study limitations were registry design and low number of kidney transplants.

**Conclusion:** With increasing numbers of dialysis centers and RRT patients during the last 12 years, the need for RRT in Turkey has been better met. The quality of RRT care has improved, especially regarding prevention and treatment of infections.


**INDEX WORDS:** Hemodialysis; national; peritoneal dialysis; registry; renal transplantation.
Cardiovascular mortality in the general population (NCHS) and in kidney failure treated by dialysis or transplant (USRDS)
In-Hospital Mortality as a Function of Creatinine Clearance

Reprinted with permission from reference 29. © 2003 American Society of Nephrology.
## Comparative Survival Analysis in Incidental Dialysis Patients
(ERA-EDTA Registry*)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Year</td>
<td>85,5</td>
<td>88,0</td>
<td>86</td>
</tr>
<tr>
<td>2. Year</td>
<td>76,6</td>
<td>77,9</td>
<td>77</td>
</tr>
<tr>
<td>5. Year</td>
<td>49,8</td>
<td>---</td>
<td>69</td>
</tr>
</tbody>
</table>

*2005 ve 2007 ERA-EDTA Registry Annual Reports, adjusted data*
The Global Burden of Cardiovascular Disease Mortality (1990-2020)

<table>
<thead>
<tr>
<th>World</th>
<th>Developed</th>
<th>Developing</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990</td>
<td>10.6 m</td>
<td>4.1 m</td>
</tr>
<tr>
<td>2020</td>
<td>20.2 m</td>
<td>5.6 m</td>
</tr>
</tbody>
</table>

*In million subjects
United States

Growth to year 2010 projected on the basis of historical data (1982-1997) by stepwise autoregression and exponential smoothing models

Total Medicare ESRD expenditures per person per year, by modality
Period prevalent ESRD patients.

Costs of the Medicare & ESRD programs
*Starting in 2006, total Medicare costs include Part D; ESRD data here, however, do not include Part D, making ESRD's portion of Medicare costs appear lower than in prior years.
Predicted Dialysis Cost of Approximately $1.1 Trillion For The Coming Decade

# ESRD – Economical Burden (Annual Cost)

## USA

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>$52,000</td>
</tr>
<tr>
<td>PD</td>
<td>$45,000</td>
</tr>
<tr>
<td>Tx</td>
<td>$18,000</td>
</tr>
</tbody>
</table>

**Total Cost of RRT in 1997**: $14.2 billion

**Total Cost of RRT in 2010**: $28.3 billion

## TR

<table>
<thead>
<tr>
<th>Year</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>$22,759</td>
</tr>
<tr>
<td>PD</td>
<td>$22,350</td>
</tr>
<tr>
<td>Tx</td>
<td>$23,393 (1. year)  $10,028 (2. year)</td>
</tr>
</tbody>
</table>

**Total Cost of RRT in 2006**: $1,218,650,000

**Total Cost of RRT in 2016**: ~ $2.5 billion
The rate of expenditures for the treatment of ESRD Patients requiring RRT (according to total health budget)

- USA: 6%
- JAPAN: 5%
- TAIWAN: 8%
- TURKEY: 5%
Awareness of CKD (NHANES Data)

Stage 1-4 CKD; in 2992 adult patients

<table>
<thead>
<tr>
<th>Year</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>4.7</td>
</tr>
<tr>
<td>2001-2002</td>
<td>8.9</td>
</tr>
<tr>
<td>2003-2004</td>
<td>9.2</td>
</tr>
<tr>
<td>Average</td>
<td>7.8</td>
</tr>
</tbody>
</table>

Chronic Kidney Disease (CKD Stage I-IV)
# Population Based Studies on CKD Epidemiology

<table>
<thead>
<tr>
<th>Study</th>
<th>Country</th>
<th>Design</th>
<th>N</th>
<th>MA %</th>
<th>CKD %</th>
</tr>
</thead>
<tbody>
<tr>
<td>NHANES III</td>
<td>USA</td>
<td>CS/L</td>
<td>15,626</td>
<td>12</td>
<td>11</td>
</tr>
<tr>
<td>PREVEND</td>
<td>Holland</td>
<td>CS/L</td>
<td>40,000</td>
<td>7</td>
<td>-</td>
</tr>
<tr>
<td>NEOERICA</td>
<td>UK</td>
<td>CS/Hizmet bazl</td>
<td>130,226</td>
<td>-</td>
<td>11(F), 6(M)</td>
</tr>
<tr>
<td>HUNT II</td>
<td>Norway</td>
<td>CS</td>
<td>65,181</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>EPIC- Norfolk</td>
<td>UK</td>
<td>CS</td>
<td>23,964</td>
<td>12</td>
<td>-</td>
</tr>
<tr>
<td>MONICA- Augsburg</td>
<td>Germany</td>
<td>CS</td>
<td>2,136</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>AusDiab</td>
<td>Australia</td>
<td>CS</td>
<td>11,247</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Taiwan</td>
<td>Taiwan</td>
<td>CS/L</td>
<td>462,293</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Beijing</td>
<td>China</td>
<td>CS</td>
<td>13,925</td>
<td>-</td>
<td>13</td>
</tr>
<tr>
<td>Takahata</td>
<td>Japan</td>
<td>CS</td>
<td>2,321</td>
<td>14</td>
<td>-</td>
</tr>
<tr>
<td>CREDIT</td>
<td>Türkiye</td>
<td>CS/ L</td>
<td>10,872</td>
<td>10,2; A:2</td>
<td>15,7</td>
</tr>
</tbody>
</table>

Comprehensive Clinical Nephrology 4th Ed. 2010 pp:908
Demographic Features of CKD

- **Race:** CKD affects all races, but, in the USA, the incident rate for blacks is nearly 4 times that for whites.

- **Sex:** Frequency of CKD is similar in both sexes.

- **Age:** CKD is found in persons of all ages. The highest incidence rate of ESRD occurs in patients older than 65 years.
Chronic Renal Disease in Turkey
Primary Purpose

To determine the **prevalence of chronic kidney disease (CKD)** in general population in Turkey according to the following groups:

- gender
- age groups
- residential areas
- geographic regions
Secondary Purpose

To detect the prevalences of the following **comorbidities** such as:

- hypertension
- diabetes mellitus
- obesity
- metabolic syndrome
- hyperlipidemia
- hyperuricemia
Study Design

- The CREDIT phase I was cross-sectional, stratified, clustered probability samples of the Turkish general population.

- Cluster sampling with strata and quota
  - Strata (geographic regions, residential area (urban/rural))
  - Quota (gender, age groups, number of subjects from each household)
This study was conducted on 10872 adult (>18 y) subjects in 23 provinces.
Field Activities

- Every field team has made house visits according to preselected lists of clusters (streets and villages).
- The subjects have been selected according to the age and gender quota of individual clusters.
- The following parameters have been obtained for each person:
  - Detailed questionnaire including medical history etc
  - Height and Weight measurements
  - Waist and hip circumference measurements
  - Blood pressure measurements
- Collection of blood and urine samples from each person
Laboratory Measurements-1

- To make the diagnosis of CKD
  - Serum creatinine level
    - JAFFE MOD-PICRATE Abbott (ARCHITECT C 8000)
  - Creatinine in spot urine
    - JAFFE GEN.2 Roche (COBAS INTEGRA 400 PLUS)
  - Albumin in spot urine
    - TURBI DOMETRIC Roche (COBAS INTEGRA 400 PLUS)
  - Complete urinalysis
To assess the diagnosis of co-morbid situations:

- Fasting blood glucose
- Lipid panel (total cholesterol, LDL-cholesterol, HDL-cholesterol and triglyceride)
- Serum uric acid level
GFR Estimation Based on Serum Creatinine

The abbreviated Modification of Diet in Renal Disease (MDRD) Study formula

\[
\text{GFR (mL/min/1.73 m}^2\text{)} = 186 \times (\text{SCr})^{-1.154} \times (\text{Year})^{-0.203} \times (\text{if female } 0.742) \times (\text{if black } 1.210)
\]
Definition of CKD

- Low glomerular filtration rate (GFR) which is lower than 60 mL/min/1.73 m²
  
  and/or

- The presence of renal damage
  - Microalbuminuria (alb / creatinine in morning spot urine)

NFK, K/DOQI, 2002
# Stages of Chronic Kidney Disease

<table>
<thead>
<tr>
<th>Stage</th>
<th>Definition</th>
<th>GFR (mL/ min/ 1.73 m²)</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Kidney damage and normal GFR</td>
<td>≥90 + MA/A</td>
</tr>
<tr>
<td>2</td>
<td>Kidney damage and mild decrease in GFR</td>
<td>60-89 + MA/A</td>
</tr>
<tr>
<td>3</td>
<td>Moderate decrease in GFR</td>
<td>30-59</td>
</tr>
<tr>
<td>4</td>
<td>Severe decrease in GFR</td>
<td>15-29</td>
</tr>
<tr>
<td>5</td>
<td>Kidney failure (dialysis or kidney Tx needed)</td>
<td>&lt;15</td>
</tr>
</tbody>
</table>
Definition of Microalbuminuria / Albuminuria

- A random spot urine sample was obtained from participants examined at a mobile examination center using a clean-catch technique and sterile containers.
- Urine albumin and creatinine concentrations were measured in the same laboratory during all surveys.
- Urinary albumin-to-creatinine ratio was computed and is reported in milligrams per gram.
Definition of Microalbuminuria /Albuminuria

ACR: Albumin(mg) /Creatinine (g) in spot urine sample

- Normoalbuminuria (<30mg/g)
- Microalbuminuria (30-300mg/g)
- Macroalbuminuria (>300mg/g)
Criteria for Metabolic Abnormalities

- Hyperglycemia ($\geq 126 \text{ mg/dl}; \text{ ADA}$)
- Hypercholesterolemia ($\geq 200 \text{ mg/dl}; \text{ ATP III}$)
- High LDL-Chol ($\geq 100 \text{ mg/dl}; \text{ ATP III}$)
- Low HDL-Chol ($< 40 \text{ mg/dl}; \text{ ATP III}$)
- Hypertrillyceridemia ($\geq 150 \text{ mg/dl}; \text{ ATP III}$)
- Hyperuricemia ($\geq 5.5 \text{ mg/dl}; \text{ JNC-VII}$)
Chronic Renal Disease
In TURKEY (CREDIT)

RESULTS
### Demographic Characteristics

- **Total population**: 10872
- **Gender (F/M)(%)**: 55.7/44.3
- **Age (year)(m±sd)**
  - Female: 43.8±15
  - Male: 46.2±16
- **Age groups (%)**
  - 19-29: 18.7
  - 30-39: 24.1
  - 40-49: 20
  - 50-59: 16.5
  - 60-69: 14.7
  - >70: 6.4
RESULTS

Renal Function/Albuminuria
eGFR* Levels by Age Groups

<table>
<thead>
<tr>
<th>GFR (ml/min/1.73m²)</th>
<th>Female</th>
<th>Male</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>87.5+/-19.9</td>
<td>90.3+/-21.6</td>
</tr>
</tbody>
</table>

p<0.001

n: 5110 (F), n: 4947 (M)

*: MDRD Formula
eGFR* Levels By Gender and Age Groups

GFR (ml/min/1.73 m²)

p<0.001

n: 10.056

Female

Male

19-29 30-39 40-49 50-59 60-69 70-79 >80
Prevalence of Albuminuria (Micro/Macro) In General Population by Gender

<table>
<thead>
<tr>
<th></th>
<th>Female</th>
<th>Male</th>
<th>General</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microalbuminuria</td>
<td>11.4%</td>
<td>8.9%</td>
<td>10.2%</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Macroalbuminuria</td>
<td>2.1%</td>
<td>1.8%</td>
<td>2%</td>
<td></td>
</tr>
</tbody>
</table>
Microalbuminuria* (%) by Age Groups

*: $\geq 30\text{mg/g}$; albumin / creatinine in spot urine
RESULTS

CKD Prevalence and Stages
CKD Prevalence in Turkey

(Female vs Male: p<0.001; OR: 0.65 (%95 CI: 0.58-0.73)
Rates of CKD by Age Groups

n: 8765
p<0.001

% of CKD by Age Groups:
- 19-29: 10%
- 30-39: 8.5%
- 40-49: 12.6%
- 50-59: 18.2%
- 60-69: 32.7%
- 70-79: 41.3%
- >80: 54.7%
Rates of CKD by Residential Areas

N: 8765

- Urban: 15.2%
- Rural: 16.8%

P = 0.049
Rates of CKD By Geographic Regions

n: 8765  p<0.001

Marmara  Aegean  Black Sea  Mediterranean  Central Anatolia  Eastern Anatolia  Southeastern Anatolia  Overall

%
CKD Prevalence by Stages in Turkey

<table>
<thead>
<tr>
<th>Stage</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>5.43</td>
</tr>
<tr>
<td>II</td>
<td>5.15</td>
</tr>
<tr>
<td>III</td>
<td>4.67</td>
</tr>
<tr>
<td>IV</td>
<td>0.27</td>
</tr>
<tr>
<td>V</td>
<td>0.15</td>
</tr>
</tbody>
</table>
CKD & Its Stages in Turkey

- <15: 0.15
- 15-29: 0.27
- 30-59: 4.67
- 60-89: 5.15
- ≥ 90: 5.43

N (x1000)
Total Count of CKD Patients in Turkey

CKD (Stage 1-5) Patients Number: 7,307,315

CKD (Stage 3-5) Patients Number: 2,369,059
Prevalences of Co-Morbid Situations in Adult Population

- HT: 32.7%
- DM: 12.7%
- Obesity: 20.1%
- Abd. Obs.: 32.1%
- Met Synd: 31.3%
- Act. Cig. Smoker: 35.2%
Frequency of Diabetes

<table>
<thead>
<tr>
<th>Year</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>7.2%</td>
</tr>
<tr>
<td>2009</td>
<td>12.6%</td>
</tr>
</tbody>
</table>

TURDEP in 2002; Satman et al: Diabetes Care 25: 1551-1556, 2002
CREDIT Study in 2008
Prevalences of CKD According to Co-morbidity (HT, DM etc)

<table>
<thead>
<tr>
<th>Comorbidity</th>
<th>CKD (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hypertension</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>10,6</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Present</td>
<td>25,3</td>
<td></td>
</tr>
<tr>
<td><strong>Diabetes Mellitus</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>13,0</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Present</td>
<td>32,4</td>
<td></td>
</tr>
<tr>
<td><strong>Obesity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>14,1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Present</td>
<td>21,3</td>
<td></td>
</tr>
<tr>
<td><strong>Metabolic syndrome</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Absent</td>
<td>12,3</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Present</td>
<td>21,9</td>
<td></td>
</tr>
</tbody>
</table>
CREDIT – CKD Predictors (Logistic Regression Analysis)

- Female gender,
- Elderly people,
- Living in some geographic regions (for example; Marmara and Southeast Anatolia)
- Rural settlement
- Presence of comorbidity (İ.e. hypertension, diabetes mellitus)
Chronic kidney disease (CKD) is rapidly growing public health problem in developed and developing countries. A striking increase in prevalence of end-stage renal disease (ESRD) requiring RRT has been observed in Turkey over the past 20 years as well as around the world. We performed a nationwide epidemiologic study (CREDIT-prevalance) to understand the real aspects of CKD in Turkey.
Conclusion-2

- CREDIT study, a nationwide epidemiologic survey has already defined the prevalence and related issues of CKD in Turkey.
- CKD prevalence in Turkey is higher than those of many Western Countries. CKD mainly affects women, elderly people and patients with comorbidities.
- Prevalences of hypertension, diabetes mellitus, obesity, metabolic syndrome, cigarette smoking and lipid abnormalities are also quite high; all these risk factors contribute to the development of CKD and may be responsible for high prevalence of CKD.
- National strategies should be developed to control the related risk factor and minimize the morbidity and mortality of CKD / ESRD.
Supporters /Contributors

- Turkish Society of Nephrology
- Ministry of Health
- TUBITAK (SBAG – 3184)
- Fresenius Medical Care
Thank you very much for your attention