Trend and projection of mortality rate

due to

non-communicable diseases in Iran:

A modeling study

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Trend and projection of mortality rate due to non-communicable diseases in Iran: A modeling study

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The aim of this study

- Determine the trend of deaths from NCDs (2001-2015)

- Determine the projection of deaths from NCDs by 2030

- Its differences among the provinces

Non Communicable Diseases

Introduction

- Epidemiologic and demographic transition around the world

- paying attention to non-communicable diseases (NCDs)

- Target 3–4 of the sustainable development goals (SDGs):

  - ✓ reduce the total NCDs mortality rate by one third by 2030

Introduction

- All deaths worldwide by NCDs: 71.3% (70.8–72.0)

- DALYs for NCDs; 59.7 (51.7–67.7%) *(2016)*

- 80% of all NCDs related deaths in low and middle-income countries

- **NCDs in Iran (a middle income country):**

    - ✓ account for 79.2% (77.7% -80.7%) of all deaths

    - ✓ 74% (71.5–76.4%) of the burden of diseases
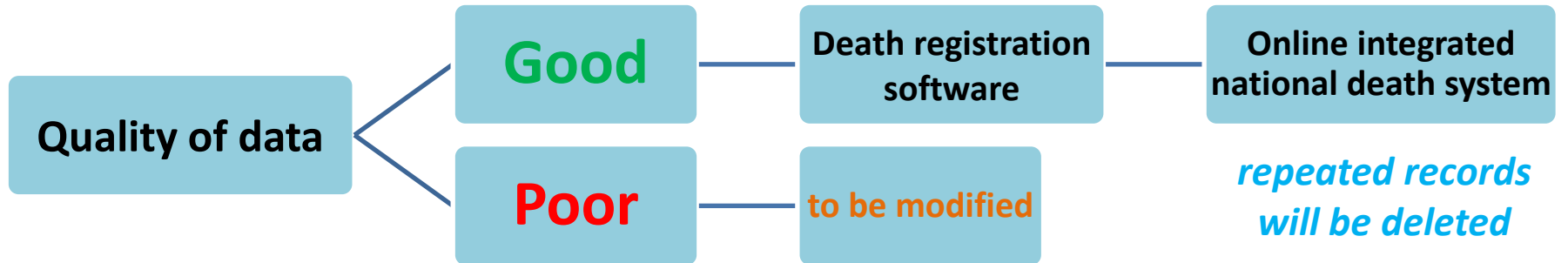
Introduction

Policymakers and health planners needs:

- Deep understanding of the needs and priorities

- Implementing optimal allocation of resources

- Providing appropriate service packages

Methods:

- By Iranian Death Registry System (DRS)

- Projection the trends of 4 major categories of NCDs:

    ✓ Cancers

    ✓ Cardiovascular diseases

    ✓ Asthma and COPD

    ✓ Diabetes

Death data:

- Since 1995 all deaths in Iran have been registered via death certificate

- >60% of total number of deaths account by Hospitals

- Other deaths outside the hospital (e.g. in private and public clinics and home death):

    ✓ Must be approved by the physician

- Abnormal and suspicious deaths are referred to the forensic medicine

- The task of collecting reports and controlling its quality:

    ✓ **city health center**

Death data:

Quality of data

Good — Death registration software — Online integrated national death system

Poor — to be modified — *repeated records will be deleted*

Death data:

Why 2001?

- **from 1995 to 2000:**

    recorded the causes of death only in 17 major categories

- **since 2001:**

    the death registration system became more detailed

Methods:

- Deaths were categorized into 13 age groups with 5-year intervals

  (25–29, 30–34, . . ., 80–84, 85+)

- Mortality rate:

  dividing the number of deaths for age, sex, province of

  residence by the population

Methods:

- Age standardized mortality rate

- Standard population:

  Iranian population in 2015

- Spatio-temporal model was employed to make projection

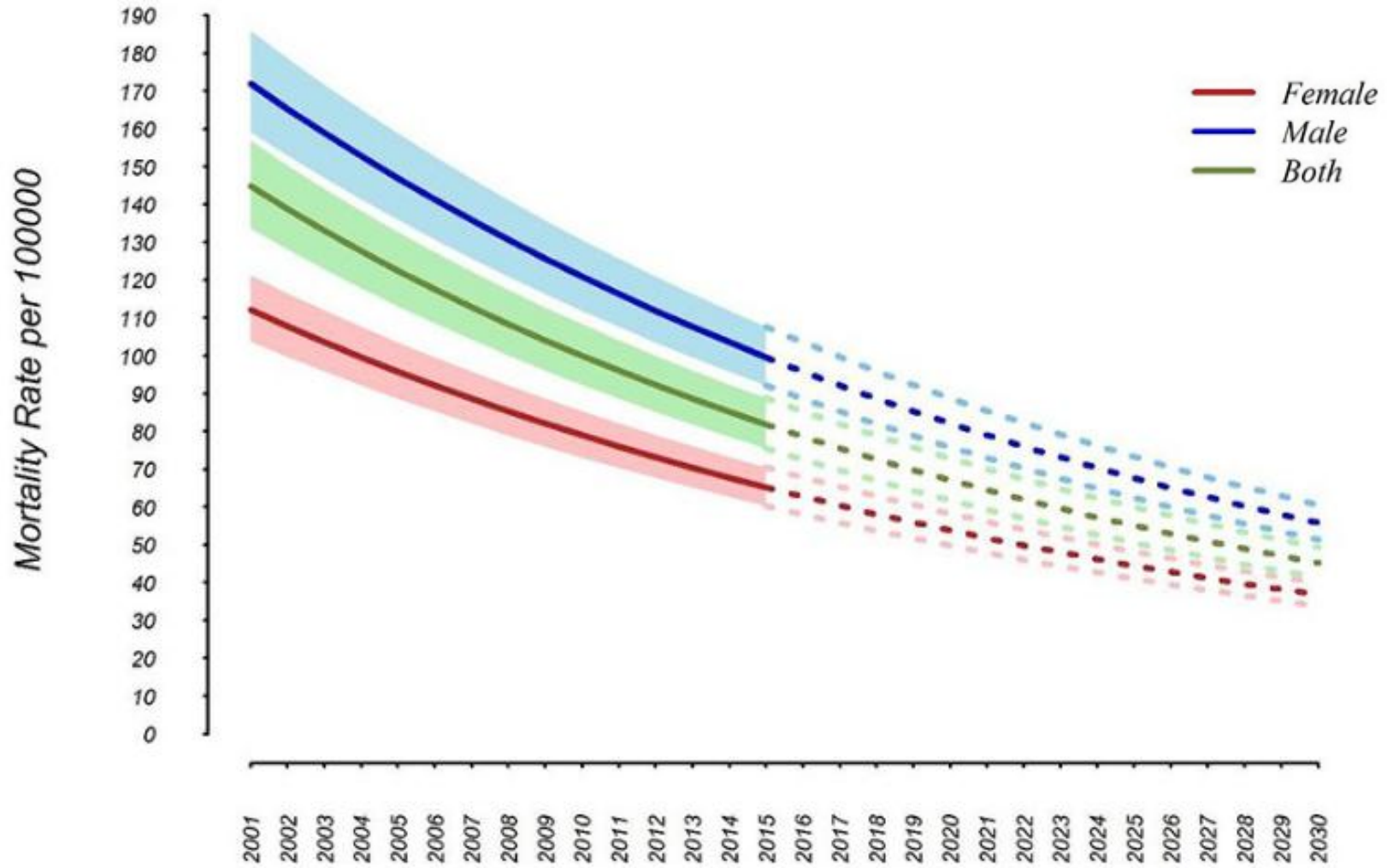# *Results*

Results:

Cancers

Results:

CVDs

Results:

Asthma & COPDs

Results:

Diabetes

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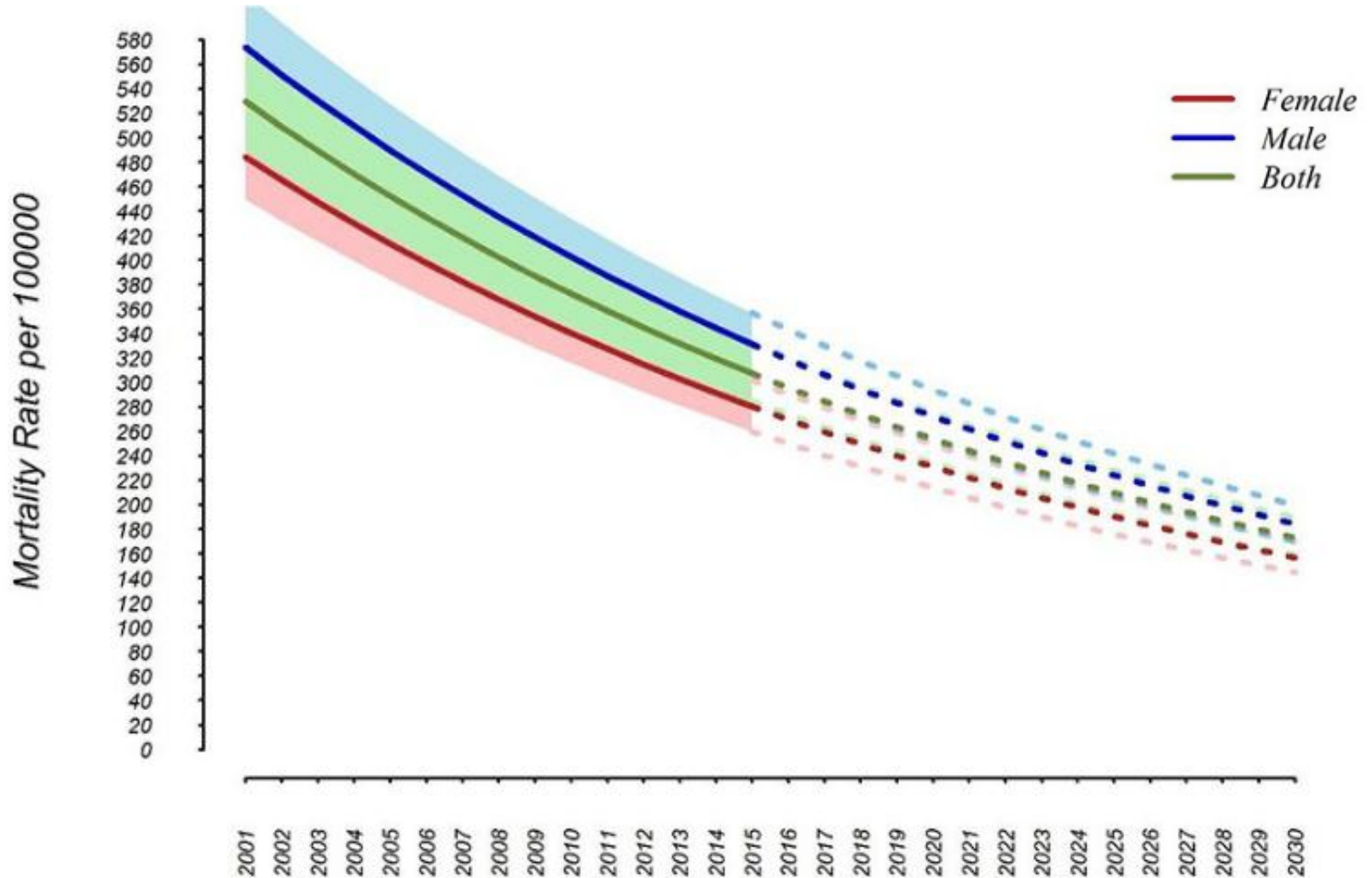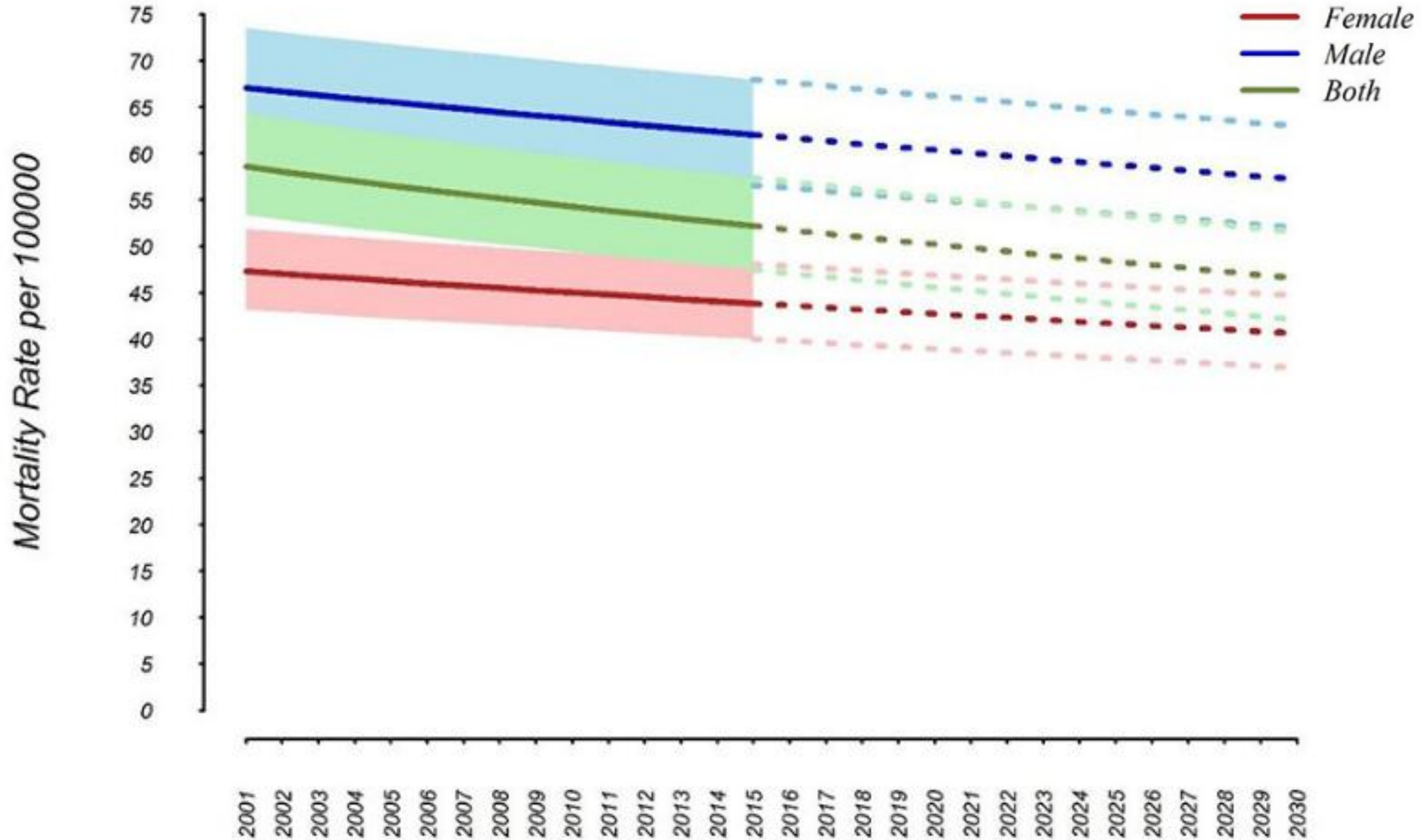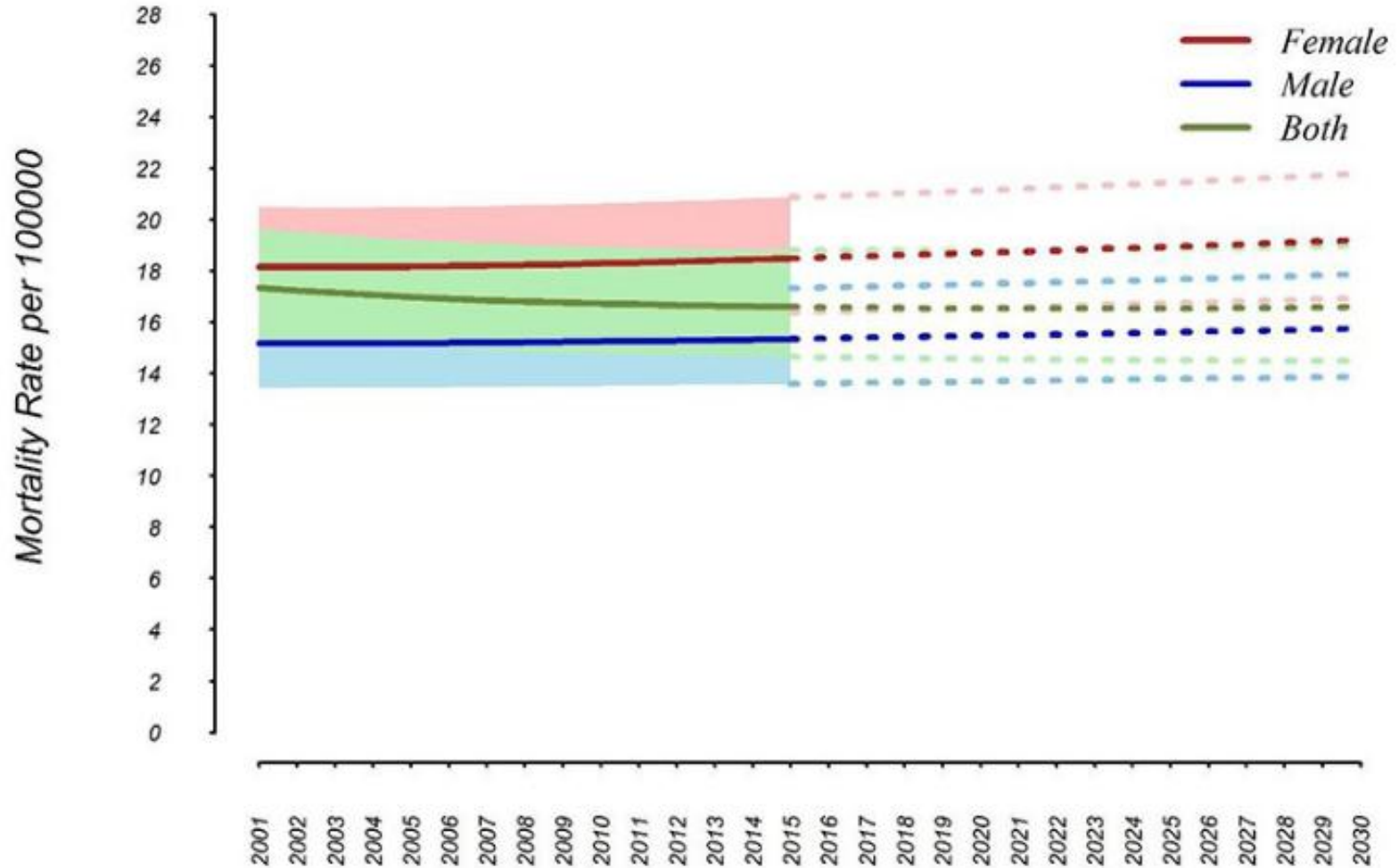
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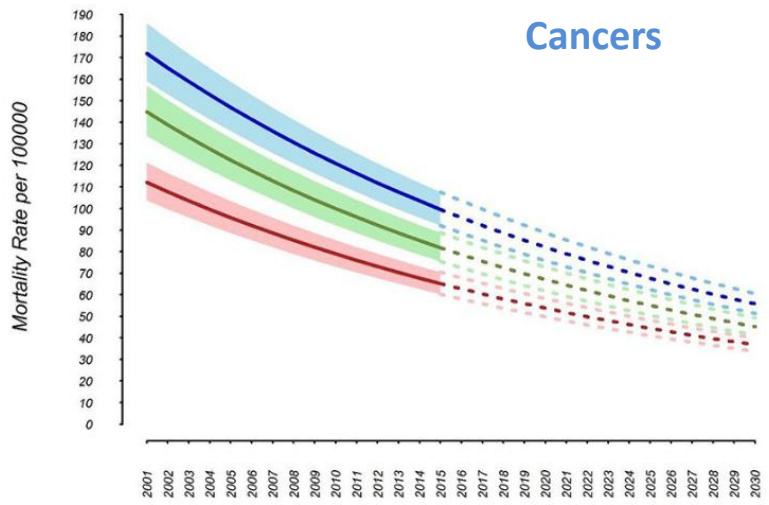
Cancers

CVDs
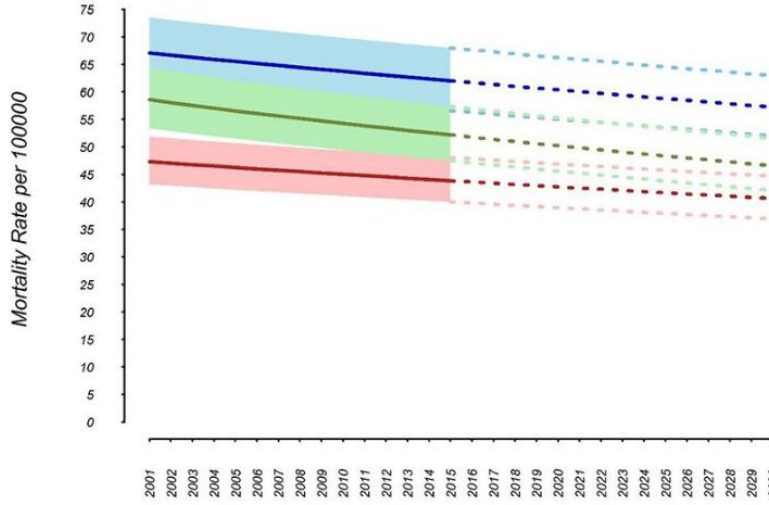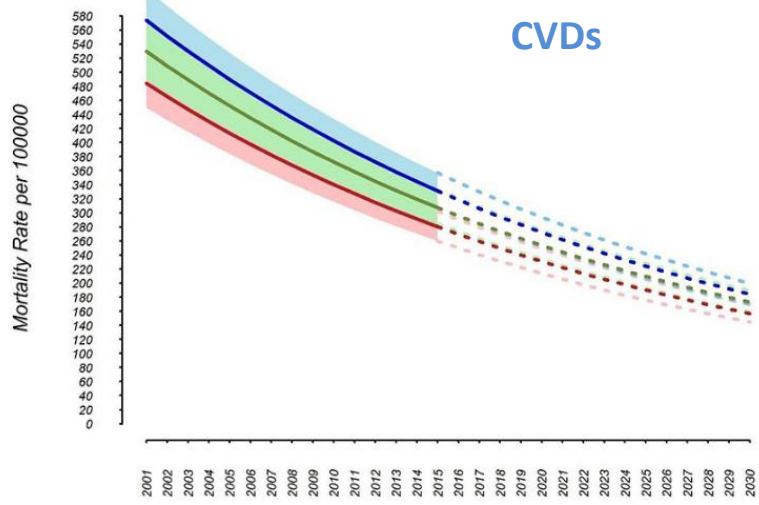
Asthma & COPDs

Diabetes

Age-standardized mortality rates and percent change (from 2015 to 2030) for NCDs in both sexes for provinces in Iran, by cause

Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change*	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
Iran	144.8	81.8	45.2	-44.7	529.7	307.3	173.0	-43.6	58.6	52.1	46.6	-10.6	17.3	16.6	16.5	0.0
	(129.3–150.8)$	(78.4–91.5(	(46.0–54.2)		(484.9–562.2)	(288.1–334.1)	(165.1–193.6)		(51.9–62.3)	(49.2–59.1)	(46.5–56.3)		(14.3–18.2)	(15.6–19.9)	(17.3–22.3)	

Age-standardized mortality rates and percent change (from 2015 to 2030) for NCDs in both sexes for provinces in Iran, by cause

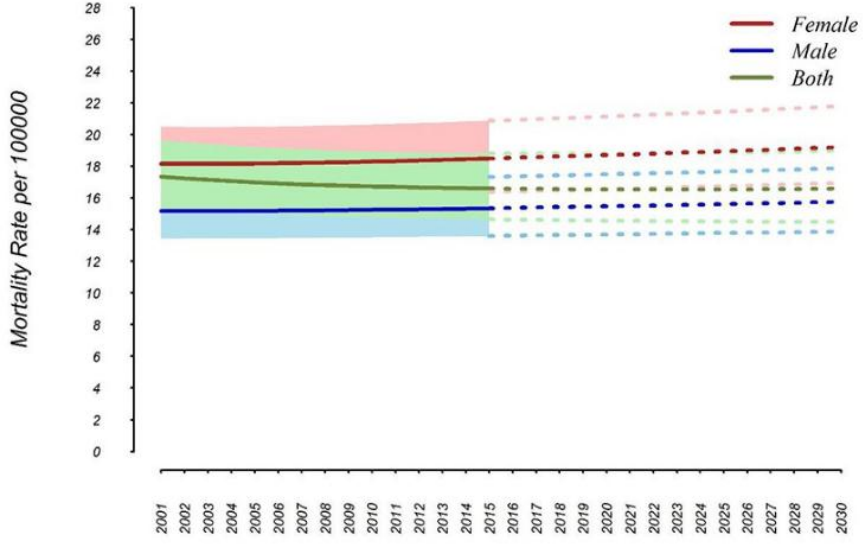| Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
Iran	144.8	81.8	45.2	-44.7	529.7	307.3	173.0	-43.6	58.6	52.1	46.6	-10.6	17.3	16.6	16.5	0.0
	(129.3–150.8)[a]	(78.4–91.5(	(46.0–54.2)		(484.9–562.2)	(288.1–334.1)	(165.1–193.6)		(51.9–62.3)	(49.2–59.1)	(46.5–56.3)		(14.3–18.2)	(15.6–19.9)	(17.3–22.3)	
Markazi	139.7	84.7	49.9	-41.0	522.1	310.3	178.8	-42.3	56.9	53.9	51.2	-5.1	16.1	17.6	19.6	11.4
	(129.3–150.8)	(78.4–91.5)	(46.0–54.2)		(484.9–562.2)	(288.1–334.1)	(165.1–193.6)		(51.9–62.3)	(49.2–59.1)	(46.5–56.3)		(14.3–18.2)	(15.6–19.9)	(17.3–22.3)	
Gilan	150.9	86.6	48.1	-44.4	549.5	322.6	182.6	-43.3	60.0	53.7	48.0	-10.6	18.5	18.1	17.8	-1.5
	(139.1–163.6)	(79.7–94.1)	(43.9–52.5)		(507.9–594.5)	(297.5–349.9)	(167.1–199.6)		(50.1–60.5)	(43.4–53.0)	(37.2–46.4)		(13.3–17.1)	(12.0–15.7)	(10.8–14.6)	
Mazandaran	135.4	75.0	40.0	-46.6	522.5	302.9	169.2	-44.1	55.0	48.0	41.5	-13.4	15.1	13.8	12.6	-8.6
	(124.8–146.8)	(68.8–81.8)	(36.3–44.1)		(482.9–565.5)	(278.1–329.9)	(153.3–186.7)		(50.1–60.5)	(43.4–53.0)	(37.2–46.4)		(13.3–17.1)	(12.0–15.7)	(10.8–14.6)	
East Azerbaijan	147.3	78.9	41.3	-47.5	530.8	301.1	167.1	-44.4	59.5	50.8	43.3	-14.6	17.9	15.3	13.5	-11.7
	(136.2–159.2)	(73.0–85.2)	(38.0–44.9)		(492.3–572.3)	(279.6–324.4)	(154.0–181.3)		(54.3–65.3)	(46.3–55.6]	(39.3–47.7)		(15.8–20.2)	(13.6–17.3)	(11.9–15.4)	
West Azerbaijan	145.3	72.3	34.6	-52.1	524.1	286.5	151.3	-47.1	59.5	47.9	38.2	-20.1	17.6	13.1	9.8	-25.4
	(134.3–157.2)	(66.7–78.3)	(31.6–37.8)		(485.7–565.5)	(265.3–309.4)	(138.5–165.3)		(54.2–65.3)	(43.6–52.6)	(34.5–42.4)		(15.5–19.8)	(11.6–14.8)	(8.5–11.2)	
Kermanshah	154.2	85.2	45.4	-46.6	541.6	310.2	171.9	-44.5	61.8	54.3	47.3	-12.7	19.5	17.8	16.3	-8.2
	(142.5–166.9)	(78.8–92.0)	(41.9–49.2)		(501.8–584.6)	(287.9–334.1)	(159.1–185.6)		(56.4–67.9)	(49.5–59.5)	(43.1–52.0)		(17.3–22.1)	(15.8–20.1)	(14.4–18.5)	
Khuzestan	135.9	80.9	48.0	-40.7	510.2	303.4	177.9	-41.3	55.8	51.9	49.0	-5.7	15.3	16.1	18.0	11.6
	(142.5–166.9)	(78.8–92.0)	(41.9–49.2)		(472.5–551.1)	(281.5–327.0)	(164.4–192.6)		(50.9–61.3)	(47.4–56.9)	(44.5–53.9)		(13.6–17.4)	(14.3–18.2)	(15.9–20.4)	
Fars	143.4	86.8	51.5	-40.5	531.1	317.8	185.6	-41.6	57.6	54.3	51.6	-5.1	16.8	18.3	20.6	12.4
	(132.7–154.9)	(80.3–93.9)	(47.3–56.1)		(493.3–571.9)	(294.8–342.6)	(170.7–201.7)		(52.6–63.1)	(49.6–59.6)	(46.7–56.9)		(14.9–19.0)	(16.2–20.7)	(18.1–23.5)	
Kerman	144.8	77.1	39.1	-49.1	531.2	301.0	164.1	-45.4	58.6	49.8	41.7	-16.1	17.3	14.7	12.3	-16.4
	(134.0–156.4)	(71.2–83.5)	(35.7–42.9)		(493.3–571.1)	(278.7–325.1)	(149.8–179.8)		(53.4–64.1)	(45.4–54.7)	(37.6–46.4)		(15.3–19.5)	(13.0–16.6)	(10.7–14.1)	
Razavi Khorasan	144.1	81.8	44.5	-45.5	529.2	306.3	170.6	-44.2	58.1	52.2	46.6	-10.8	17.1	16.4	15.8	-4.1
	(133.4–155.6)	(75.7–88.4)	(41.1–48.3)		(491.4–570.0)	(284.4–329.8)	(157.9–184.3)		(53.0–63.7)	(47.7–57.2)	(42.4–51.1)		(15.1–19.2)	(14.6–18.5)	(13.9–17.8)	
Isfahan	143.5	82.7	45.6	-44.8	532.8	307.2	169.8	-44.7	57.0	52.4	47.8	-8.8	16.7	16.7	16.5	-0.9
	(132.4–155.6)	(76.3–89.6)	(41.9–49.6)		(492.6–576.2)	(283.9–332.3)	(156.4–184.3)		(51.8–62.6)	(47.6–57.6)	(43.3–52.6)		(14.7–18.9)	(14.7–18.9)	(14.5–18.8)	
Sistan and Baluchistan	161.1	83.1	41.3	-50.2	548.3	303.4	162.1	-46.5	65.3	54.5	45.2	-17.1	21.6	17.3	14.0	-19.3
	(148.2–175.2)	(76.7–90.1)	(38.0–44.9)		(505.2–595.1)	(280.5–328.1)	(149.5–175.9)		(59.2–72.0)	(49.6–59.9)	(41.0–49.8)		(18.9–24.5)	(15.3–19.7)	(12.3–15.9)	
Kurdistan	147.6	70.0	32.0	-54.3	524.7	281.3	146.0	-48.0	60.6	46.9	35.9	-23.4	18.2	12.4	8.4	-32.0
	(136.2–159.9)	(64.6–76.0)	(29.0–35.2)		(485.3–567.3)	(260.0–304.4)	(132.7–160.7)		(55.2–66.6)	(42.7–51.6)	(32.2–40.0)		(16.0–20.6)	(10.9–14.0)	(7.30–9.7)	
Hamadan	141.1	82.3	46.9	-43.0	522.0	308.4	177.7	-42.3	57.7	52.6	48.0	-8.8	16.5	16.7	17.2	3.2
	(130.6–152.5)	(76.2–89.0)	(43.1–51.0)		(484.5–562.4)	(286.3–332.2)	(163.6–192.9)		(52.7–63.3)	(48.0–57.7)	(43.5–52.9)		(14.6–18.6)	(14.8–18.8)	(15.1–19.6)	
Chaharmahal and Bakhtiari	147.1	84.3	47.0	-44.2	532.7	311.7	177.3	-43.1	59.5	53.7	48.4	-9.8	17.9	17.5	17.4	-0.3
	(136.1–159.0)	(78.0–91.1)	(43.2–51.1)		(494.5–573.9)	(289.3–335.9)	(163.3–192.5)		(54.3–65.2)	(49.0–58.8)	(43.9–53.3)		(15.8–20.1)	(15.5–19.7)	(15.3–19.8)	
Lorestan	150.8	74.8	35.6	-52.3	534.6	293.4	155.3	-47.0	61.1	49.0	38.8	-20.7	18.8	13.9	10.3	-26.3
	(139.3–163.1)	(69.2–80.9)	(32.6–38.9)		(495.5–576.8)	(272.1–316.3)	(142.2–169.6)		(55.7–67.0)	(44.7–53.7)	(35.0–43.0)		(16.6–21.2)	(12.3–15.7)	(8.9–11.8)	

(Continued)

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Age-standardized mortality rates and percent change (from 2015 to 2030) for NCDs in both sexes for provinces in Iran, by cause

Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change*	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
Ilam	146.2	84.5	47.5	-43.7	529.1	312.0	178.7	-42.7	59.5	53.7	48.4	-9.8	17.7	17.5	17.6	0.7
	(135.2– 158.0)	(78.3– 91.3)	(43.7– 51.6)		(491.0– 570.3)	(289.7– 336.0)	(164.7– 193.8)		(54.2– 65.2)	(49.0– 58.8)	(43.9– 53.4)		(15.7– 20.0)	(15.0– 19.8)	(15.5– 20.1)	
Kohgiluyeh and Boyer_Ahmad	148.3	77.6	38.7	-50.0	534.4	300.2	161.9	-46.0	60.5	50.4	41.5	-17.7	18.3	14.9	12.0	-19.4
	(136.7– 160.9)	(71.6– 84.0)	(35.5– 42.2)		(493.6– 578.7)	(277.9– 324.4)	(148.8– 176.3)		(55.0– 66.6)	(45.9– 55.4)	(37.5– 45.8)		(16.1– 20.7)	(13.2– 16.9)	(10.5– 13.7)	
Bushehr	140.7	97.8	69.1	-29.3	508.5	333.6	194.2	-41.7	54.0	56.5	60.4	6.9	16.3	23.1	35.6	54.1
	(132.1– 149.7)	(91.4– 104.7)	(63.0– 75.8)		(478.5– 540.4)	(235.3– 285.1)	(177.5– 212.5)		(50.1– 58.2)	(52.2– 61.2)	(54.4– 67.1)		(14.4– 18.3)	(20.4– 26.1)	(30.5– 41.4)	
Zanjan	135.3	56.5	23.0	-59.2	508.9	259.0	129.3	-50.0	56.2	39.0	26.9	-30.8	15.3	8.1	4.4	-45.7
	(125.1– 146.4)	(51.3– 62.1)	(20.1– 26.3)		(471.7– 549.0)	(235.3– 285.1)	(112.3– 148.8)		(51.2– 61.6)	(35.0– 43.4)	(23.2– 31.2)		(13.6– 17.3)	(7.0– 9.4)	(3.6– 5.4)	
Semnan	136.9	86.2	52.6	-38.9	521.6	319.9	190.4	-40.4	55.2	53.3	51.4	-3.6	15.4	17.9	21.1	17.8
	(126.6– 148.0)	(79.5– 93.3)	(48.0– 57.6)		(484.1– 562.1)	(296.0– 345.7)	(173.8– 208.5)		(50.4– 60.5)	(48.6– 58.6)	(46.3– 57.1)		(13.6– 17.3)	(15.8– 20.2)	(18.3– 24.2)	
Yazd	139.0	83.5	49.8	-40.3	521.3	314.0	186.4	-40.6	56.1	52.0	48.8	-6.1	15.9	16.8	18.9	12.2
	(128.5– 150.5)	(77.0– 90.4)	(45.4– 54.6)		(483.0– 562.8)	(290.6– 339.4)	(170.0– 204.4)		(51.1– 61.6)	(47.4– 57.2)	(43.9– 54.3)		(14.0– 17.9)	(14.8– 19.0)	(16.4– 21.7)	
Hormozgan	136.4	93.3	62.8	-32.7	513.7	325.3	200.6	-38.3	56.6	58.8	61.7	4.8	15.6	21.3	30.5	42.6
	(125.8– 147.9)	(85.9– 101.4)	(57.0– 69.1)		(474.9– 555.6)	(300.2– 352.6)	(182.1– 221.0)		(51.5– 62.2)	(53.4– 64.7)	(55.3– 68.8)		(13.7– 17.7)	(18.8– 24.2)	(26.3– 35.3)	
Tehran	160.5	93.3	51.1	-45.1	577.0	334.9	184.4	-44.9	60.2	55.7	50.7	-8.9	20.1	20.5	20.1	-1.7
	(146.5– 175.8)	(85.3– 102.0)	(46.8– 55.8)		(526.8– 632.1)	(306.5– 365.9)	(169.0– 201.1)		(54.2– 66.8)	(50.3– 61.7)	(45.8– 56.1)		(17.5– 23.2)	(17.8– 23.5)	(17.6– 23.0)	
Ardabil	145.5	77.2	39.7	-48.5	525.0	297.8	164.0	-44.9	59.6	50.2	42.0	-16.2	17.6	14.8	12.5	-15.0
	(134.4– 157.4)	(71.4– 83.4)	(36.5– 43.2)		(486.6– 566.5)	(276.5– 320.8)	(151.0– 178.3)		(54.3– 65.4)	(45.8– 55.0)	(38.1– 46.4)		(15.6– 19.9)	(13.1– 16.7)	(11.0– 14.3)	
Qom	136.2	77.3	43.6	-43.5	509.9	294.7	168.1	-42.9	55.4	49.9	45.5	-8.8	15.3	14.8	15.1	1.9
	(124.6– 148.8)	(70.9– 84.4)	(40.0– 47.5)		(467.0– 556.7)	(270.4– 321.1)	(154.4– 182.9)		(50.0– 61.3)	(45.2– 55.2)	(41.2– 50.3)		(13.3– 17.5)	(12.9– 16.9)	(13.2– 17.2)	
Qazvin	141.0	81.7	44.6	-45.3	523.5	303.5	167.2	-44.9	57.3	52.7	47.6	-9.6	16.4	16.5	16.1	-2.7
	(130.6– 152.3)	(75.6– 88.3)	(41.2– 48.4)		(486.2– 563.7)	(281.8– 327.0)	(154.6– 180.9)		(52.3– 62.7)	(48.1– 57.7)	(43.3– 52.3)		(14.5– 18.5)	(14.6– 18.7)	(14.2– 18.2)	
Golestan	140.6	87.7	53.3	-39.2	524.2	320.0	189.7	-40.7	57.5	55.2	53.1	-3.8	16.4	18.8	22.0	17.0
	(130.0– 152.1)	(80.9– 95.1)	(48.7– 58.4)		(485.8– 565.6)	(295.9– 346.2)	(173.3– 207.8)		(52.4– 62.7)	(50.2– 60.7)	(47.8– 58.9)		(14.5– 18.5)	(16.6– 21.3)	(19.1– 25.3)	
North Khorasan	142.9	75.9	38.7	-48.9	524.2	297.7	163.2	-45.1	58.8	49.5	41.2	-16.6	17.0	14.3	12.0	-16.3
	(131.9– 154.8)	(70.0– 82.2)	(35.4– 42.3)		(485.0– 566.5)	(275.4– 321.9)	(149.3– 178.4)		(53.5– 64.5)	(45.0– 54.4)	(37.2– 45.7)		(15.0– 19.3)	(12.6– 16.2)	(10.4– 13.7)	
South Khorasan	151.0	86.7	47.5	-45.2	538.2	318.1	180.6	-43.2	61.4	54.7	48.2	-11.9	18.9	18.4	17.61	-4.2
	(139.3– 163.7)	(79.9– 94.0)	(43.4– 51.9)		(497.7– 582.1)	(293.9– 344.4)	(165.1– 197.6)		(55.8– 67.5)	(49.8– 60.2)	(43.5– 53.5)		(16.7– 21.4)	(16.2– 20.8)	(15.3– 20.2)	
Alborz	151.4	91.7	52.9	-42.2	550.3	329.0	188.0	-42.8	58.8	55.6	52.0	-6.5	18.4	20.0	21.4	7.2
	(139.3– 164.6)	(84.2– 99.9)	(48.4– 57.9)		(507.2– 597.1)	(302.5– 357.9)	(171.9– 205.7)		(53.4– 64.8)	(50.3– 61.4)	(46.8– 57.6)		(16.1– 20.9)	(17.5– 22.8)	(18.7– 24.6)	

Age-standardized mortality rates and percent change (from 2015 to 2030) for NCDs in both sexes for provinces in Iran, by cause

Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change*	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
Zanjan	135.3	56.5	23.0	-59.2	508.9	259.0	129.3	-50.0	56.2	39.0	26.9	-30.8	15.3	8.1	4.4	-45.7
	(125.1–146.4)	(51.3–62.1)	(20.1–26.3)		(471.7–549.0)	(235.3–285.1)	(112.3–148.8)		(51.2–61.6)	(35.0–43.4)	(23.2–31.2)		(13.6–17.3)	(7.0–9.4)	(3.6–5.4)	
Semnan	136.9	86.2	52.6	-38.9	521.6	319.9	190.4	-40.4	55.2	53.3	51.4	-3.6	15.4	17.9	21.1	17.8
	(126.6–148.0)	(79.5–93.3)	(48.0–57.6)		(484.1–562.1)	(296.0–345.7)	(173.8–208.5)		(50.4–60.5)	(48.6–58.6)	(46.3–57.1)		(13.6–17.3)	(15.8–20.2)	(18.3–24.2)	
Yazd	139.0	83.5	49.8	-40.3	521.3	314.0	186.4	-40.6	56.1	52.0	48.8	-6.1	15.9	16.8	18.9	12.2
	(128.5–150.5)	(77.0–90.4)	(45.4–54.6)		(483.0–562.8)	(290.6–339.4)	(170.0–204.4)		(51.1–61.6)	(47.4–57.2)	(43.9–54.3)		(14.0–17.9)	(14.8–19.0)	(16.4–21.7)	
Hormozgan	136.4	93.3	62.8	-32.7	513.7	325.3	200.6	-38.3	56.6	58.8	61.7	4.8	15.6	21.3	30.5	42.6
	(125.8–147.9)	(85.9–101.4)	(57.0–69.1)		(474.9–555.6)	(300.2–352.6)	(182.1–221.0)		(51.5–62.2)	(53.4–64.7)	(55.3–68.8)		(13.7–17.7)	(18.8–24.2)	(26.3–35.3)	

Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change*	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
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	(125.1– 146.4)	(51.3– 62.1)	(20.1– 26.3)		(471.7– 549.0)	(235.3– 285.1)	(112.3– 148.8)		(51.2– 61.6)	(35.0– 43.4)	(23.2– 31.2)		(13.6– 17.3)	(7.0– 9.4)	(3.6– 5.4)	
Semnan	136.9	86.2	52.6	-38.9	521.6	319.9	190.4	-40.4	55.2	53.3	51.4	-3.6	15.4	17.9	21.1	17.8
	(126.6– 148.0)	(79.5– 93.3)	(48.0– 57.6)		(484.1– 562.1)	(296.0– 345.7)	(173.8– 208.5)		(50.4– 60.5)	(48.6– 58.6)	(46.3– 57.1)		(13.6– 17.3)	(15.8– 20.2)	(18.3– 24.2)	

Age-standardized mortality rates and percent change (from 2015 to 2030) for NCDs in both sexes for provinces in Iran, by cause

Provinces	Cancers				Cardiovascular diseases				Ashtma & COPD				Diabetes			
	2001	2015	2030	% Change*	2001	2015	2030	% change	2001	2015	2030	% change	2001	2015	2030	% change
Zanjan	135.3	56.5	23.0	-59.2	508.9	259.0	129.3	-50.0	56.2	39.0	26.9	-30.8	15.3	8.1	4.4	-45.7
	(125.1– 146.4)	(51.3– 62.1)	(20.1– 26.3)		(471.7– 549.0)	(235.3– 285.1)	(112.3– 148.8)		(51.2– 61.6)	(35.0– 43.4)	(23.2– 31.2)		(13.6– 17.3)	(7.0– 9.4)	(3.6– 5.4)	
Chaharmahal and Bakhtiari	147.1	84.3	47.0	-44.2	532.7	311.7	177.3	-43.1	59.5	53.7	48.4	-9.8	17.9	17.5	17.4	-0.3
	(136.1– 159.0)	(78.0– 91.1)	(43.2– 51.1)		(494.5– 573.9)	(289.3– 335.9)	(163.3– 192.5)		(54.3– 65.2)	(49.0– 58.8)	(43.9– 53.3)		(15.8– 20.1)	(15.5– 19.7)	(15.3– 19.8)	

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Age-standardized cancers mortality rate (Per 100,000) in 2001, 2015, 2030

Female

Male

Both

Year: 2001
Cause: Cancer

Mortality Rate Per 100000
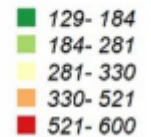
- ■ 129- 184
- ■ 184- 281
- ■ 281- 330
- ■ 330- 521
- ■ 521- 600

Age-standardized cancers mortality rate (Per 100,000) in 2001, 2015, 2030

Female

Male

Both

Year: 2015
Cause: Cancer

Mortality Rate Per 100000
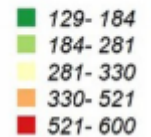
- ■ 129- 184
- ■ 184- 281
- ■ 281- 330
- ■ 330- 521
- ■ 521- 600

Age-standardized cancers mortality rate (Per 100,000) in 2001, 2015, 2030

Female

Male

Both

Year: 2030
Cause: Cancer

Mortality Rate Per 100000

- 129- 184
- 184- 281
- 281- 330
- 330- 521
- 521- 600
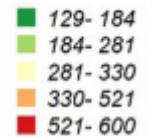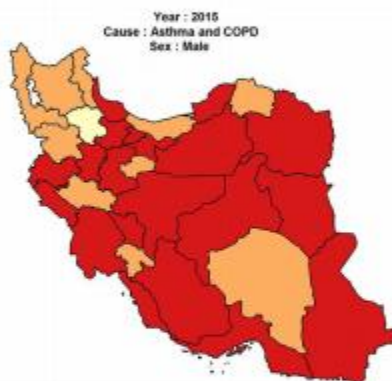
Age-standardized CVDs mortality rate (Per 100,000) in 2001, 2015, 2030
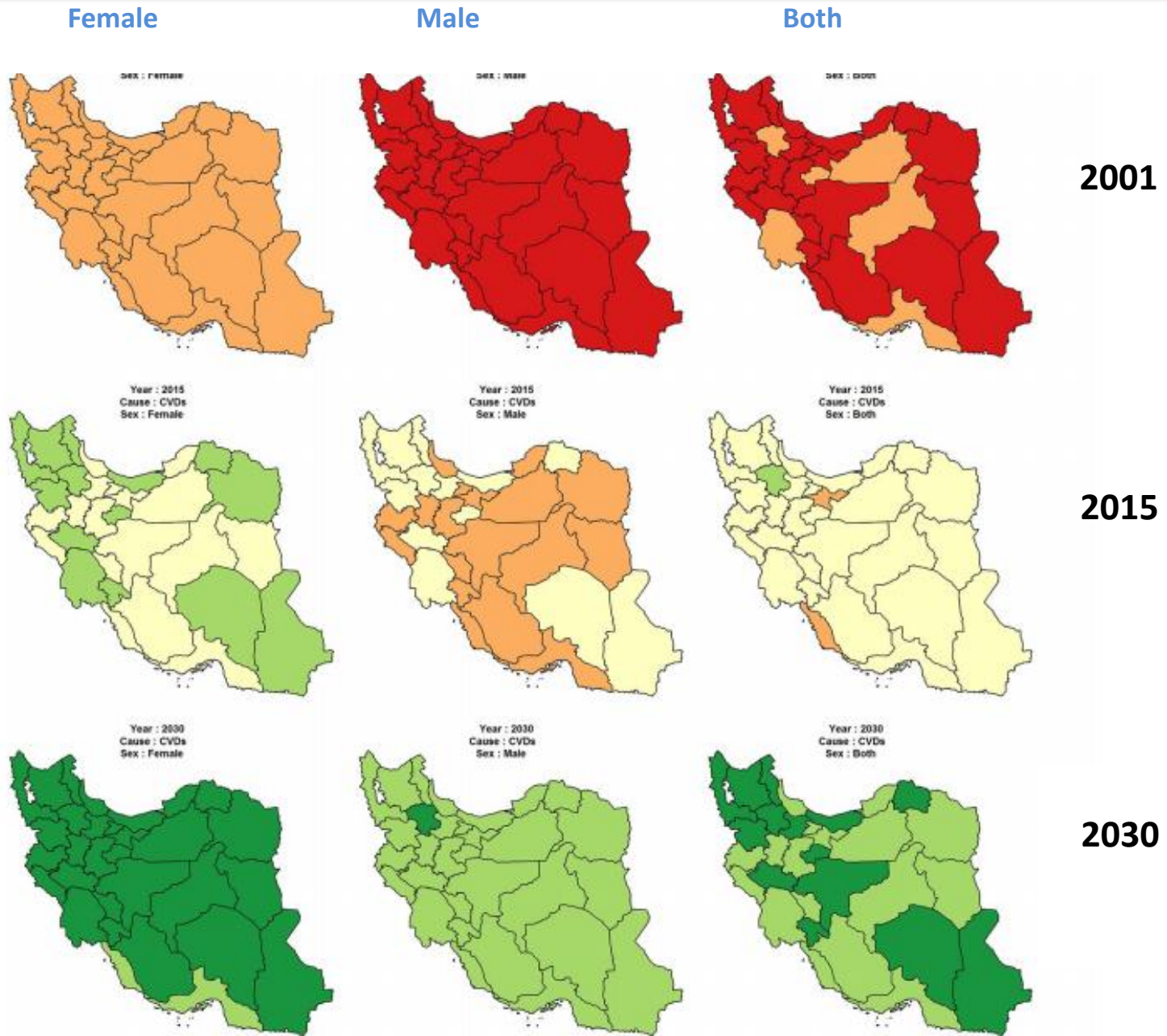
Female   Male   Both

2001

2015

2030

33

Female **Male** **Both**
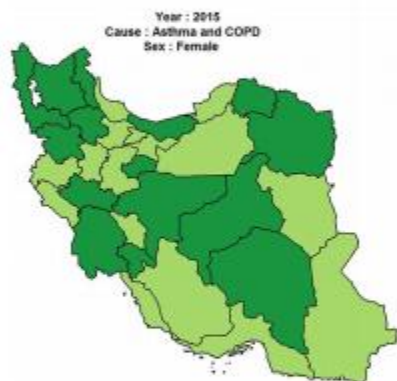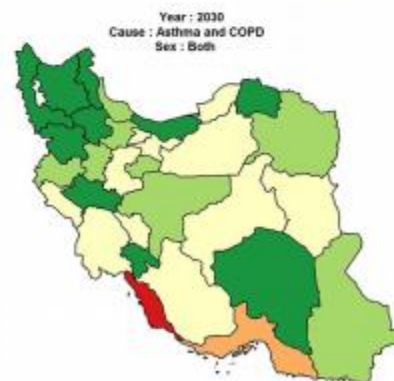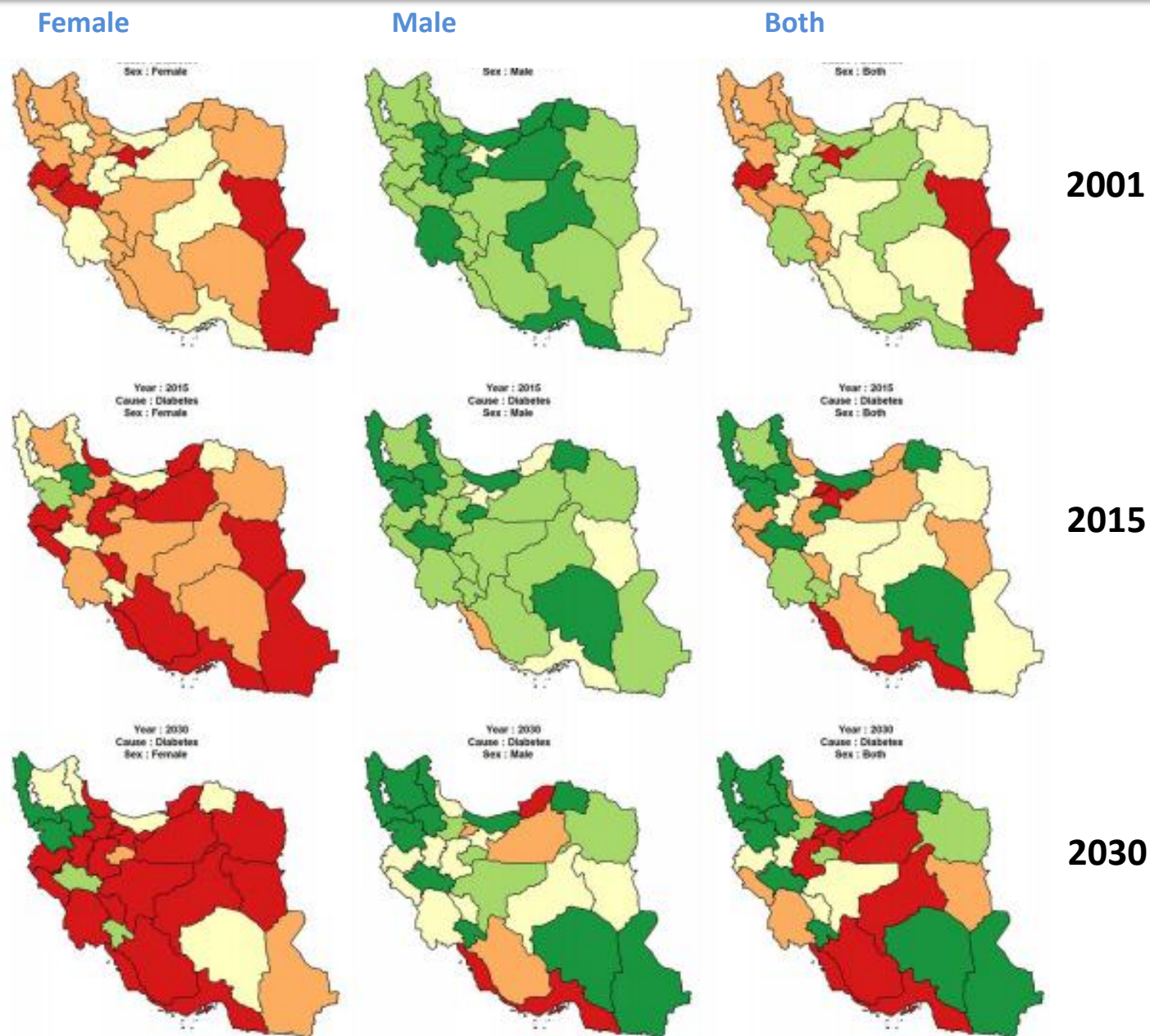
2001

2015

2030

Proportional mortality from NCDs in Iran
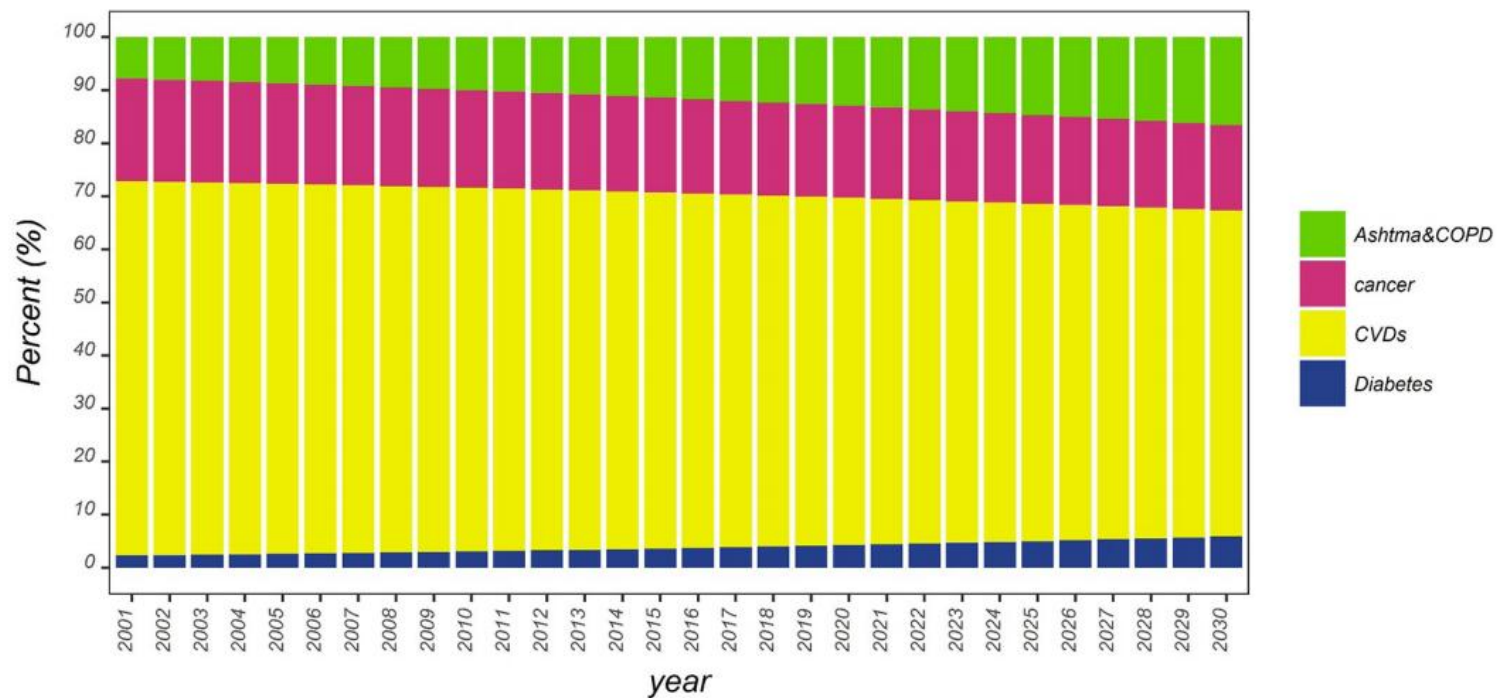
	2001	2015	2030
CVDs	70.5	67.1	61.4
Cancers	19.2	16.7	16
Asthma & COPD	7.8	11.3	16.5
Diabetes	2.3	3.6	5.8

Discussion:

- The trend of cancers and cardiovascular disease mortalities in Iran:

  is expected to decrease moderately

- Asthma and COPD:

  there will be a decrease

- The trend of diabetes:

  will slowly increase

Discussion:

- The mortality rate of cancers, CVD, asthma and COPD:

    ✓ will be higher in males than in females

    ✓ and this trend will continue until 2030

- In terms of diabetes:

    ✓ the mortality rate will be higher in females

    ✓ and it will continue

Discussion:

- **Cancers** in the southern, northern, and central provinces:

  ✓ will decrees slowly in both sexes

- **cardiovascular diseases** in the southeastern, northwest, and

  central province:

  ✓ will have a higher decrease in both sexes

- The mortality rate for **asthma and COPD**:

  ✓ will be higher in southern provinces and metropolitan areas

Discussion:

- Mortality rate for **diabetes** in most provinces is high;

    ✓ whereas mortality rate will be even higher in the southern,

    central and Northern provinces

Discussion:

- **In Brazil:**

  ✓ a decreasing trend was observed for **cancers** (1990-2015)

  ✓ age-adjusted mortality rate for **CVD** was cut by 24% (2001 to 2011)

- **In Sweden:**

  ✓ 15.5% reduction in the **cancers** mortality rate (1991 to 2006)

Discussion:

Why the incidence of cancers mortality in most developed countries is decreasing?

- early screening and diagnosis

- effective prevention and treatment interventions

However, cancers mortality rate in most developing countries

is steady or still on the rise

Discussion:

Some of studies have shown that cancers mortality in males is higher than females

- experiencing different risk factors including:

- tobacco smoking

- occupational exposure

- hormonal changes

Discussion:

- A study in 188 countries in the period from 2013 to 2025 showed:

  - ✓ the overall trend of premature mortality rate from

    cardiovascular diseases is decreasing

With the decrease in the prevalence of risk factors of cardiovascular diseases, it will be possible to achieve a 25% reduction in the mortality rate by 2025

Discussion:

- **In Argentina (2000-2011):**

  ✓ **cardiovascular disease** mortality fell from 12.75 to 10.09

- **In China (1990-2013):**

  ✓ mortality trend of **IHD** in **males** had been increasing

  ✓ where, it had been decreasing among **females**

  ✓ increasing trend for **cancers**

  ✓ decreasing trend for **COPD**

Discussion:

- **Myocardial Infarction** trend in the United States, Brazil, Japan, England, Sweden, Canada, Ireland, and Denmark:

  - ✓ Decreasing the incidence of In and Out of hospital mortality

Discussion:

- **In a trend study of asthma and COPD in Iran (2001 to 2015):**

    ✓ the trend of COPD mortality had **increased**

    ✓ COPD mortality rate was higher in males (12.3) than in females (8.4)

    ✓ mortality rate from asthma was higher in males (8.8%) than in females (7.2%)

    ✓ **decreased** in the overall trend of asthma

Discussion:

- **Global Burden of Disease Project in Brazil: (1990-2015)**

    o during this period, mortality rate of diabetes was on the rise

    o diabetes had been sharply increased in both sexes

- **In another study carried out in China:**

    o 13.1% decrease in the number of deaths from premature NCDs

    o one-third reduction in premature NCDs deaths by 2030

    o diabetes showed an increasing trend

Discussion:

- the mortality from diabetes in females was observed to be higher

- Generally, the incidence of diabetes shows an increasing trend in most countries

Why?

- ✓ overweight and obesity epidemics

- ✓ food consumption patterns (high calorie diets)

- ✓ urban development and sedentary lifestyles

Discussion:

reduction of cardiovascular mortality rate in <u>developed countries</u>:

- might be better **management** of risk factors

- early detection of patients due to more **comprehensive care**

- as well as improved **literacy** and **awareness** across the country

- improvement of drug strategies and diagnostic and therapeutic

  interventions:

  > using antihypertensive drugs, statins, aspirin, heparin, beta-
  >
  > blocker, streptokinase and captopril.

Discussion:

In Iran, however, the prevalence of these risk factors is increasing

Some of the other possible explanations for this decrease in Iran:

- ✓ improving the accuracy of death certificates

- ✓ improving the registration system

- ✓ reducing garbage codes for cardiovascular diseases

Discussion:

Believing that the mortality rate will decrease may not be an easy notion to understand. However hard to believe, this decrease **may be** the result of **better management of risk factors** and **early detection of patients** due to **more comprehensive care** in all segments of society, as well as improved **literacy** and **awareness** across the country

Discussion:

limitations in this study:

- health registry data have had some problems:

    incompleteness, misclassification, and duplications

- data availability for some new provinces

One of the strengths of this study:

- ✓ employing 15-year national data

Research priorities in non-communicable diseases in developing

countries: time to go beyond prevalence studies

Recommendations:

1. more attention to interventions carried out at the primary prevention

- ✓ **Primary care health delivery models**

- ✓ identification and management of modifiable risk factors

- ✓ diagnosis, treatment and follow-up

- ✓ where necessary, referral using standard protocols

2. Educational interventions at community and raising people's awareness

3. Promotion of research in priority areas & most efficient use of scarce

resources

Service delivery model for CVD management using the HEARTS technical package

District hospital

Primary health care

HEARTS

Community health worker

Specialist treatment
- Initial review of high-risk patients and all secondary prevention cases
- Review of complex cases referred from outpatient health clinic
- Provide doctor to supervise medical clinics in primary health care

Risk screening, assessment and management
- Cardiovascular risk assessment
- Blood pressure, body mass index, urinalysis, blood glucose, total cholesterol
- Counselling on risk factors
- Referral of acute events to next level, medication

Health education
- Screening of population for risk factors
- Providing lifestyle interventions (tobacco cessation, physical activity, diet)
- Referral of individuals with risk factors to primary health care

H Healthy lifestyle

E Evidence-based treatment protocols

A Access to essential medicines and technology

R Risk-based management

T Team care and task-sharing

S Systems for monitoring

Factors contributing to the development of cardiovascular disease and complications

Social determinants and drivers

Globalization

Urbanization

Ageing

Income

Education

Housing

Behavioural risk factors

Unhealthy diet

Tobacco use

Physical inactivity

Harmful use of alcohol

Metabolic risk factors

High blood pressure

Obesity

High blood sugar (diabetes)

High blood cholesterol

Cardiovascular disease

Hearts attacks

Strokes

Heart failure

Kidney disease

Key points for NCD research in LMICs:

- **Define** 'best practices' in clinical and community-based interventions

- **Implement** 'best practices' in clinical and population settings

- Develop **primary care models** for NCD management

- Conduct **large cohort** studies to provide information

- Improve **patient adherence** and enhance **self-management**

- economic evaluations to study the **cost-effectiveness** of the different interventions

- Promote **patient-centered care**