

**Table 1 cont.** – Characteristics of adults with HF\*, NEDS and NIS, 2006, 2011 and 2017 (use heart failure any diagnosis for this table)

	Diabetes status	Emergency Department (NEDS)**						Inpatient (NIS)					
		2006		2011		2017		2006		2011		2017	
		N	%	N	%	N	%	N	%	N	%	N	%
Second quartile	yes	85,225	29.8	125,087	27.5	268,279	28.0	406,474	26.5	466,148	25.3	639,255	27.2
	no	160,980	28.8	198,215	26.9	355,320	27.5	670,920	26.1	604,367	25.1	714,885	27.0
Third quartile	yes	63,322	22.2	98,071	21.5	186,367	19.4	340,853	22.2	447,474	24.3	514,840	21.9
	no	125,866	22.5	165,483	22.4	268,241	20.7	598,751	23.3	593,410	24.6	608,900	23.0
Fourth quartile (wealthiest)	yes	34,886	12.2	59,563	13.1	121,124	12.6	272,696	17.8	302,516	16.4	365,980	15.6
	no	85,056	15.2	114,868	15.6	199,544	15.4	527,656	20.5	480,756	20.0	504,725	19.1
US region													
Northeast	yes	33,609	11.5	46,079	9.9	86,556	8.9	320,429	20.4	354,641	18.9	426,350	17.9
	no	81,856	14.3	87,542	11.6	144,018	10.9	501,525	19.1	507,939	20.7	513,079	19.1
Midwest	yes	85,067	29.2	122,662	26.4	242,622	24.9	393,679	25.0	474,545	25.3	583,045	24.5
	no	156,589	27.4	193,037	25.7	328,833	25.0	658,381	25.1	611,503	24.9	644,774	23.9
South	yes	129,239	44.3	211,335	45.6	462,321	47.4	618,281	39.3	733,689	39.2	971,856	40.8
	no	234,413	41.0	322,829	42.9	578,959	44.0	1,061,978	40.4	938,078	38.2	1,059,016	39.3
West	yes	43,709	15.0	83,689	18.0	183,109	18.8	239,693	15.2	310,355	16.6	402,449	16.9
	no	99,333	17.4	148,326	19.7	264,894	20.1	405,343	15.4	397,565	16.2	476,274	17.7
<i>Comorbidities</i>													
Myocardial Infarction	yes	247,859	16.6	418,179	15.3	629,091	21.1	272,138	17.3	396,389	21.2	568,300	23.8
	no	383,379	15.1	300,754	16.5	619,893	17.5	433,155	16.5	455,611	18.6	548,890	20.4
Peripheral Vascular Disease	yes	144,798	9.7	218,434	8.0	440,161	14.8	195,980	12.5	318,289	17.0	565,005	23.7
	no	166,635	6.6	186,437	10.2	522,821	14.7	216,342	8.2	285,756	11.6	501,535	18.6
Cerebrovascular Disease	yes	98,752	6.6	187,399	6.8	123,358	4.1	120,054	7.6	184,883	9.9	133,380	5.6
	no	163,958	6.5	125,599	6.9	139,687	3.9	197,503	7.5	228,489	9.3	150,715	5.6
Dementia	yes	99,882	6.7	299,327	10.9	263,721	8.9	105,888	6.7	177,371	9.5	248,990	10.4
	no	241,362	9.5	140,117	7.7	391,736	11.0	251,099	9.6	322,289	13.1	362,215	13.4
	yes	532,654	35.7	987,082	36.0	1,178,523	39.6	574,059	36.5	740,773	39.5	972,615	40.8

Chronic Pulmonary Disease	no	921,924	36.3	672,799	36.9	1,349,228	38.1	1,016,015	38.7	951,659	38.8	1,101,715	40.9
Rheumatic Disease	yes	27,135	1.8	86,688	3.2	78,835	2.6	30,915	2.0	53,319	2.8	70,870	3.0
	no	64,962	2.6	39,071	2.1	128,802	3.6	76,293	2.9	100,400	4.1	119,205	4.4
Peptic Ulcer Disease	yes	18,072	1.2	35,223	1.3	33,329	1.1	21,700	1.4	29,251	1.6	35,165	1.5
	no	36,891	1.5	19,024	1.0	42,069	1.2	44,371	1.7	42,480	1.7	45,205	1.7
Liver Disease, Mild	yes	34,623	2.3	80,354	2.9	125,905	4.2	39,761	2.5	78,917	4.2	119,895	5.0
	no	67,995	2.7	50,306	2.8	128,975	3.6	77,314	2.9	102,382	4.2	123,860	4.6
Renal Disease, Mild to Moderate	yes	244,008	16.3	576,139	21.0	1,076,815	36.2	281,640	17.9	717,912	38.3	1,039,750	43.6
	no	263,803	10.4	551,260	30.3	855,003	24.1	308,784	11.8	657,730	26.8	837,925	31.1
Hemiplegia or Paraplegia	yes	10,333	0.7	30,742	1.1	37,755	1.3	12,234	0.8	23,801	1.3	43,430	1.8
	no	22,070	0.9	15,487	0.8	46,474	1.3	25,058	1.0	37,340	1.5	54,355	2.0
Any malignancy	yes	51,584	3.5	139,644	5.1	111,149	3.7	68,008	4.3	96,629	5.2	119,180	5.0
	no	125,689	4.9	66,860	3.7	168,915	4.8	171,192	6.5	172,419	7.0	187,905	7.0
Liver Disease, moderate to severe	yes	7,801	0.5	20,780	0.8	34,597	1.2	10,484	0.7	21,739	1.2	37,535	1.6
	no	14,861	0.6	13,485	0.7	33,431	0.9	17,231	0.7	25,950	1.1	37,905	1.4
Renal disease, severe	yes	328,819	22.0	164,424	6.0	418,838	14.1	371,670	23.6	238,246	12.7	335,555	14.1
	no	356,566	14.0	197,091	10.8	212,217	6.0	407,246	15.5	154,810	6.3	164,155	6.1
HIV/AIDS	yes	1,971	0.1	9,117	0.3	7,158	0.2	2,378	0.2	3,267	0.2	5,435	0.2
	no	8,966	0.4	3,013	0.2	16,791	0.5	9,239	0.4	8,588	0.3	11,295	0.4
Metastatic solid tumor	yes	15,407	1.0	40,665	1.5	36,266	1.2	20,809	1.3	25,695	1.4	39,840	1.7
	no	42,913	1.7	17,100	0.9	58,244	1.6	59,113	2.2	51,215	2.1	67,090	2.5

\*HF defined as any diagnosis; \*\*excludes those who were admitted to hospital

**Supplementary Table 1** ICD-9-CM codes for comorbidities

<i>Comorbidities</i>	<i>ICD-9-CM</i>	<i>ICD-10-CM</i>
Myocardial infarction	410.x, 412.x	I21.x, I22.x, I25.2
Peripheral vascular disease	093.0, 437.3, 440.X, 441.X, 443.1-443.2x, 443.8x, 443.9, 447.1, 557.1, 557.9, V43.4	I70.x, I71.x, I73.1, I73.8, I73.9, I77.1, I79.0, I79.1, I79.8, K55.8, K55.9, Z95.8, Z95.9
Cerebrovascular disease	362.34, 430.x-438.x	G45/x, G46/x, H34.0x, H34.1x, I60.x-I68.x
Dementia	290.x, 294.1x, 294.2x, 294.8, 331.0, 331.1x, 331.x, 331.7, 797	F01.x-F05x, F06.1, F06.8, G13.2, G13.8, G30.x, G31.0x, G31.1, G31.2, G91.4, G94, R41.81, R54
Chronic pulmonary disease	490.x-496.x, 500.x-505.x, 506.4, 508.1, 508.8	J40.x-J47.x, J60.x-J67.x, J68.4, J70.1, J70.3
Rheumatic disease	446.5, 710.0-710.4, 714.0-714.2, 714.8, 725.x	M05.x, M06.x, M31.5, M32.x, M33.x, M34.x, M35.1, M35.3, M36.0
Peptic ulcer disease	531.x-534.x	K25.x-K28.x
Liver disease, mild	070.22, 070.23, 070.32, 070.33, 070.44, 070.54, 070.6, 070.9, 570.x, 571.x, 573.3, 573.4, 573.8, 573.9, V42.7	B18.x, K70.x-K70.3, K70.9, K71.3, K71.4, K71.5, K71.7, K73.x, K74.x, K76.0, K76.2, K76.3, K76.4, K76.8, K76.9, Z94.4
Renal disease, mild to moderate	403.00, 403.10, 403.90, 404.00, 404.01, 404.10, 404.11, 404.90, 404.91, 582.x, 583.x, 585.1-585.4, 585.9, V42.0	I12.9, I13.0, I13.10, N03.x, N05.x, N18.1-N18.4, N18.9, Z94.0
Hemiplegia or paraplegia	334.1, 342.x, 343.x, 344.x	G04.1, G11.4, G80.0, G80.1, G80.2, G81.x, G82.x, G83.x
Any malignancy, including lymphoma and leukemia, except malignant neoplasm of skin	140.x-172.x, 174.x-195.x, 199.1, 200.x-208.x, 238.6	C33.x, C34.x, C37.x-C41.x, C43.x, C45.x-C58.x, C60.x-C63.x, C76.x, C80.1, C81.x-C85.x, C88.x, C90.x
Liver disease, moderate to severe	456.0-456.2, 572.2-572.8	I85.0x, I86.4, K70.4x, K71.1x, K72.9x, K76.5, K76.6, K76.7
Renal disease, severe*	403.01, 403.11, 403.91, 404.02, 404.03, 404.12, 404.13, 404.92, 404.93, 585.5, 585.6, 586.x, 588.0, V45.11, V45.12, V56.0, V56.1, V56.2, V56.31, V56.32, V56.8	I12.0, I13.11, I13.2, N18.5, N18.6, N19.x, M25.0, Z49.x, Z99.2
HIV/AIDS	042.x	B20.x
Metastatic solid tumor	196.x-199.0	C77.x-C79.x, C80.0, C80.2

\*Stage V kidney disease

**Supplementary Table 2** - Age-standardized inpatient hospitalization rates and rate ratios (RR)<sup>a</sup> for HF, defined as primary diagnosis, in people with vs. without diabetes in the US between 2006 and 2015

		Age-standardized inpatient admission rate (per 1,000 people) (95%CI) <sup>b</sup>			Trend 1 <sup>b</sup>		Trend 2 <sup>b</sup>	
		2006	2011	2015	Year	APC (95%CI)	Year	APC (95%CI)
<i>Total Population</i>	Diabetes	14.3 (13.1-15.5)	12.0 (11.2-12.8)	11.6 (11.0-12.3)	2006-2010	-6.0 (-11.5, -0.1)*	2010-2015	0.2 (-2.7, 3.2)
	No diabetes	3.4 (3.2-3.6)	2.7 (2.6-2.9)	2.5 (2.4-2.6)	2006-2015	-3.8 (-4.7, -2.9)*	n/a	
	RR	4.2 (3.7-4.7)	4.4 (4.0-4.8)	4.7 (4.4-5.1)	2006-2015	1.6 (0.2, 3.0)*	n/a	
<i>Sex</i>								
Men	Diabetes	15.3 (13.7-16.9)	12.8 (11.7-13.9)	13.2 (12.0-14.3)	2006-2010	-6.2 (-10.4, -1.9)*	2010-2015	1.5 (-1.1, 4.2)
	No diabetes	3.9 (3.6-4.2)	3.0 (2.8-3.3)	2.8 (2.7-3.0)	2006-2015	-3.8 (-5.0, -2.5)*	n/a	
	RR	3.9 (3.4-4.4)	4.2 (3.7-4.7)	4.7 (4.2-5.1)	2006-2015	2.6 (0.6, 4.7)*	n/a	
Women	Diabetes	13.3 (12.0-14.6)	11.3 (10.4-12.3)	10.4 (9.6-11.1)	2006-2013	-4.1 (-6.1, -2.1)*	2013-2015	4.0 (-8.2, 17.9)
	No diabetes	3.0 (2.7-3.2)	2.4 (2.3-2.6)	2.2 (2.0-2.3)	2006-2015	-3.7 (-4.7, -2.8)*	n/a	
	RR	4.5 (3.9-5.1)	4.6 (4.2-5.1)	4.8 (4.4-5.3)	2006-2015	0.8 (-0.3, 2.0)	n/a	
<i>Age group</i>								
18-44	Diabetes	4.3 (3.6-5.0)	4.2 (3.6-4.8)	5.1 (4.3-5.9)	2006-2015	1.0 (-2.0, 4.2)	n/a	
	No diabetes	0.3 (0.3-0.3)	0.2 (0.2-0.2)	0.2 (0.2-0.2)	2006-2009	-14.3 (-26.3, -0.3)*	2009-2015	0.2 (-5.8, 6.6)
	RR	15.2 (12.3-18.2)	19.6 (16.2-23.1)	21.7 (18.2-25.1)	2006-2015	3.4 (0.8, 6.0)*	n/a	
45-64	Diabetes	14.5 (12.9-16.1)	11.5 (10.4-12.5)	11.6 (10.6-12.5)	2006-2008	-12.7 (-29.7, 8.3)	2008-2015	-0.0 (-2.4, 2.4)
	No diabetes	1.8 (1.6-1.9)	1.4 (1.3-1.5)	1.5 (1.4-1.5)	2006-2012	-4.7 (-6.3, -3.0)*	2012-2015	4.1 (0.8, 7.4)*
	RR	8.2 (7.1-9.3)	8.2 (7.3-9.2)	7.9 (7.1-8.6)	2006-2015	0.4 (-0.7, 1.5)	n/a	
65-74	Diabetes	31.2 (27.3-35.1)	22.0 (20.0-24.0)	20.1 (18.3-21.9)	2006-2015	-4.4 (-5.5, -3.2)*	n/a	
	No diabetes	6.6 (6.0-7.2)	4.8 (4.5-5.2)	4.0 (3.8-4.3)	2006-2013	-7.2 (-8.5, -5.8)*	2013-2015	0.7 (-7.5, 9.6)
	RR	4.7 (4.0-5.5)	4.5 (4.0-5.1)	5.0 (4.4-5.5)	2006-2015	1.6 (0.2, 3.0)*	n/a	
≥75	Diabetes	60.2 (51.9-68.4)	54.2 (48.2-60.1)	45.2 (40.8-49.7)	2006-2015	-3.2 (-4.7, -1.7)*	n/a	
	No diabetes	26.2 (23.9-28.5)	21.6 (20.0-23.1)	18.9 (17.8-20.1)	2006-2015	-3.6 (-4.5, -2.7)*	n/a	
	RR	2.3 (1.9-2.7)	2.5 (2.2-2.8)	2.4 (2.1-2.7)	2006-2015	0.3 (-1.6, 2.2)	n/a	

<sup>a</sup>Rate ratio is rate in diabetes/rate in non-diabetes; <sup>b</sup>Years 2006, 2011 and 2017 are displayed in this table for ease of presentation; <sup>c</sup>Indicates the year in which trends change significantly in either direction or magnitude; \* $p_{\text{trend}} < 0.05$ ; n/a=no second trend identified; Data sources: NCHS, National Health Interview Survey and AHRQ, National Inpatient Sample

**Supplementary Table 3** - Age-standardized ED visit rates and rate ratios (RR)<sup>a</sup> for HF, defined as primary diagnosis, in people with versus without diabetes in the US between 2006 and 2015

		Age-standardized ED visit rate (per 1,000 people) (95%CI) <sup>b</sup>			Trend 1 <sup>b</sup>		Trend 2 <sup>b</sup>	
		2006	2011	2015	Year	APC (95%CI)	Year	APC (95%CI)
<i>Total Population</i>	Diabetes	1.8 (1.6-2.0)	1.5 (1.4-1.7)	2.2 (2.0-2.4)	2006-2011	-4.6 (-8.3, -0.7)*	2011-2015	11.4 (6.1, 16.9)*
	No diabetes	0.7 (0.6-0.7)	0.5 (0.5-0.6)	0.7 (0.7-0.8)	2006-2012	-4.5 (-8.1, -0.7)*	2012-2015	10.7 (-0.5, 23.1)
	RR	2.7 (2.3-3.0)	3.0 (2.6-3.3)	3.2 (2.8-3.5)	2006-2015	1.9 (0.6, 3.2)*	n/a	
<i>Sex</i>								
Men	Diabetes	1.9 (1.7-2.1)	1.7 (1.5-1.9)	2.6 (2.2-2.9)	2006-2010	-6.5 (-12.8, 0.2)	2010-2015	9.6 (4.0, 15.6)*
	No diabetes	0.8 (0.7-0.8)	0.6 (0.6-0.7)	0.8 (0.8-0.9)	2006-2012	-3.8 (-7.0, -0.6)*	2012-2015	9.1 (-0.5, 19.7)
	RR	2.5 (2.1-2.9)	2.8 (2.4-3.2)	3.1 (2.6-3.6)	2006-2015	2.1 (0.2, 4.0)*	n/a	
Women	Diabetes	1.7 (1.5-1.9)	1.4 (1.3-1.6)	1.9 (1.7-2.1)	2006-2012	-4.3 (-5.8, -2.8)*	2012-2015	13.7 (8.8, 18.8)*
	No diabetes	0.6 (0.5-0.6)	0.5 (0.4-0.5)	0.6 (0.6-0.6)	2006-2015	0.0 (-0.0, 0.0)	n/a	
	RR	2.8 (2.4-3.2)	3.2 (2.7-3.6)	3.2 (2.8-3.6)	2006-2015	1.3 (0.1, 2.5)*	n/a	
<i>Age group</i>								
18-44	Diabetes	0.8 (0.6-0.9)	0.8 (0.6-0.9)	1.2 (1.0-1.4)	2006-2012	-1.7 (-7.5, 4.4)	2012-2015	17.7 (1.6, 36.4)*
	No diabetes	0.1 (0.1-0.1)	0.1 (0.1-0.1)	0.1 (0.1-0.1)	2006-2015	0.0 (-0.0, 0.0)	n/a	
	RR	9.0 (6.9-11.2)	11.3 (8.6-14.0)	13.8 (10.7-17.0)	2006-2015	3.2 (0.7, 5.7)*	n/a	
45-64	Diabetes	2.0 (1.7-2.3)	1.6 (1.4-1.7)	2.3 (2.1-2.6)	2006-2011	-5.2 (-8.7, -1.6)*	2011-2015	12.4 (7.0, 18.0)*
	No diabetes	0.5 (0.4-0.5)	0.4 (0.3-0.4)	0.5 (0.5-0.6)	2006-2008	-13.0 (-23.6, 12.3)	2008-2015	3.8 (0.4, 7.5)*
	RR	4.4 (3.7-5.1)	4.4 (3.7-5.1)	4.6 (3.9-5.3)	2006-2008	-5.3 (-14.9, 5.5)	2008-2015	2.0 (0.4, 3.6)*
65-74	Diabetes	3.5 (3.0-4.0)	2.5 (2.2-2.8)	3.5 (3.1-4.0)	2006-2012	-5.4 (-8.7, -2.0)*	2012-2015	12.3 (0.3, 25.8)*
	No diabetes	1.4 (1.3-1.5)	1.0 (0.9-1.1)	1.3 (1.2-1.4)	2006-2012	-6.4 (-8.7, -4.2)*	2012-2015	11.7 (3.7, 20.3)*
	RR	2.5 (2.1-3.0)	2.5 (2.1-2.8)	2.8 (2.4-3.2)	2006-2015	1.0 (-0.3, 2.4)		
≥75	Diabetes	5.9 (5.1-6.8)	5.5 (4.8-6.3)	6.9 (6.0-7.8)	2006-2010	-5.7 (-10.4, -0.8)*	2010-2015	5.8 (1.9, 9.8)*
	No diabetes	4.5 (4.1-5.0)	3.5 (3.2-3.8)	4.8 (4.4-5.2)	2006-2012	-3.8 (-6.3, -1.2)*	2012-2015	11.0 (1.0, 21.9)*
	RR	1.3 (1.1-1.5)	1.6 (1.3-1.8)	1.4 (1.2-1.7)	2006-2015	0.7 (-1.5, 3.0)		

<sup>a</sup>Rate ratio is rate in diabetes/rate in non-diabetes; <sup>b</sup>Years 2006, 2011 and 2017 are displayed in this table for ease of presentation; <sup>c</sup>Indicates the year in which trends change significantly in either direction or magnitude; \* $p_{\text{trend}} < 0.05$ ; n/a=no second trend identified; Data sources: NCHS, National Health Interview Survey and AHRQ, National Emergency Department Sample