Association of Food Insecurity and Metabolic Syndrome among NHANES Participants 1999-2014

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Abstract

Introduction

Food Security is access at all times to enough food for an active, healthy life; food insecurity exists when ever the availability of nutritionally adequate and safe foods is limited or uncertain(1). In 2010, it was estimated that approximately 50 million Americans were food insecure (2). Houselholds reporting food insecurity report a decrease in the frequency of comnsumption of fruits and vegetables(3). Previous has research has found an association between food insecurity and hyperlipidemia, hypertension, diabetes(4,5), peripheral arterial disease (6), and poor cardiovascular health (7).

Methods

Results

Table 1: Charactersitcs of Study Participants by Food Security Status

	Not Food Insecure	Food Insecure	Missing
	(n=8877) N(%)	(n=3594) N(%)	(n=240) N(%)
Gender			
Female	4340(49)	1869(52)	118(49)
Race			
Non-Hispanic White	4318(49)	1101(31)	81(34)
Mexican American	1435(16)	1002(28)	66(28)
Other Hispanic	649(7)	403(11)	16(7)
Non-Hispanic Black	1655(19)	893(25)	58(24)
Other (including multiracial)	298(3)	82(2)	12(5)
Missing	522(6)	113(3)	7(3)
Education			
Less than 9th Grade	601(7)	606(17)	26(11)
9-11th Grade	1126(13)	826(23)	38(16)
High School Grad	1944(22)	891(25)	71(30)
Some College/AA	2705(30)	998(28)	68(28)
College Graduate or above	2497(28)	267(7)	36(15)
Missing	4(0)	6(0)	1(0)
Income			
Under $20,000	1407(16)	1595(44)	7(3)
$20,000 - $54,999	3100(35)	1487(41)	82(34)
$55,000-$74,999	1149(13)	185(5)	27(11)
$75,000 and Over	2709(31)	130(4)	18(8)
Missing	512(6)	197(5)	106(44)
Alcohol Use			
Never	993(11)	467(13)	29(12)
Moderate	3297(37)	930(26)	73(30)
Heavy	2854(32)	1364(38)	76(32)
Missing	1733(20)	833(23)	62(26)
Smoking Status			
Never	5047(57)	1748(49)	138(57)
Former	1935(22)	586(16)	50(21)
Current	1838(21)	1198(33)	50(21)
Missing	57(1)	62(2)	2(1)
Moderate Phys Act			
Yes	4642(52)	1738(48)	119(50)
No	3265(37)	1502(42)	107(45)
Missing	970(11)	354(10)	14(6)
	Mean(SD)	Mean(SD)	Mean(SD)
Age	43(13)	40(13)	41(13)

Table 2: Charactersitcs of Study Participants by Food Security Category

	Fully Food Secure	Marginal Food Security	Low Food Security	Very Low Food Security	Missing
	(n=8877) N(%)	(n=1405) N(%)	(n=1370) N(%)	(n=819) N(%)	(n=240) N(%)

	Fully Food Secure	Marginal Food Security	Low Food Security	Very Low Food Security	Missing
Gender					
Female	4340(49)	741(53)	697(51)	431(53)	118(49)
Race					
Non-Hispanic White	4318(49)	391(28)	372(27)	338(41)	81(34)
Mexican American	1435(16)	405(29)	442(32)	155(19)	66(28)
Other Hispanic	649(7)	146(10)	159(12)	98(12)	16(7)
Non-Hispanic Black	1655(19)	381(27)	320(23)	192(23)	58(24)
Other (including multiracial)	298(3)	28(2)	39(3)	15(2)	12(5)
Missing	522(6)	54(4)	38(3)	21(3)	7(3)
Education					
Less than 9th Grade	601(7)	183(13)	294(21)	129(16)	26(11)
9-11th Grade	1126(13)	297(21)	331(24)	198(24)	38(16)
High School Grad	1944(22)	374(27)	308(22)	209(26)	71(30)
Some College/AA	2705(30)	415(30)	336(25)	247(30)	68(28)
College Graduate or above	2497(28)	132(9)	100(7)	35(4)	36(15)
Missing	4(0)	4(0)	1(0)	1(0)	1(0)
Income					
Under $20,000	1407(16)	525(37)	616(45)	454(55)	7(3)
$20,000 - $54,999	3100(35)	626(45)	553(40)	308(38)	82(34)
$55,000-$74,999	1149(13)	108(8)	58(4)	19(2)	27(11)
$75,000 and Over	2709(31)	78(6)	43(3)	9(1)	18(8)
Missing	512(6)	68(5)	100(7)	29(4)	106(44)
Alcohol Use					
Never	993(11)	191(14)	187(14)	89(11)	29(12)
Moderate	3297(37)	361(26)	342(25)	227(28)	73(30)
Heavy	2854(32)	531(38)	527(38)	306(37)	76(32)
Missing	1733(20)	322(23)	314(23)	197(24)	62(26)
Smoking Status					
Never	5047(57)	729(52)	678(49)	341(42)	138(57)
Former	1935(22)	240(17)	229(17)	117(14)	50(21)
Current	1838(21)	407(29)	440(32)	351(43)	50(21)
Missing	57(1)	29(2)	23(2)	10(1)	2(1)
Moderate Phys Act					
Yes	4642(52)	671(48)	651(48)	416(51)	119(50)
No	3265(37)	581(41)	580(42)	341(42)	107(45)
Missing	970(11)	153(11)	139(10)	62(8)	14(6)
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)
Age	43(13)	40(14)	41(13)	40(13)	41(13)

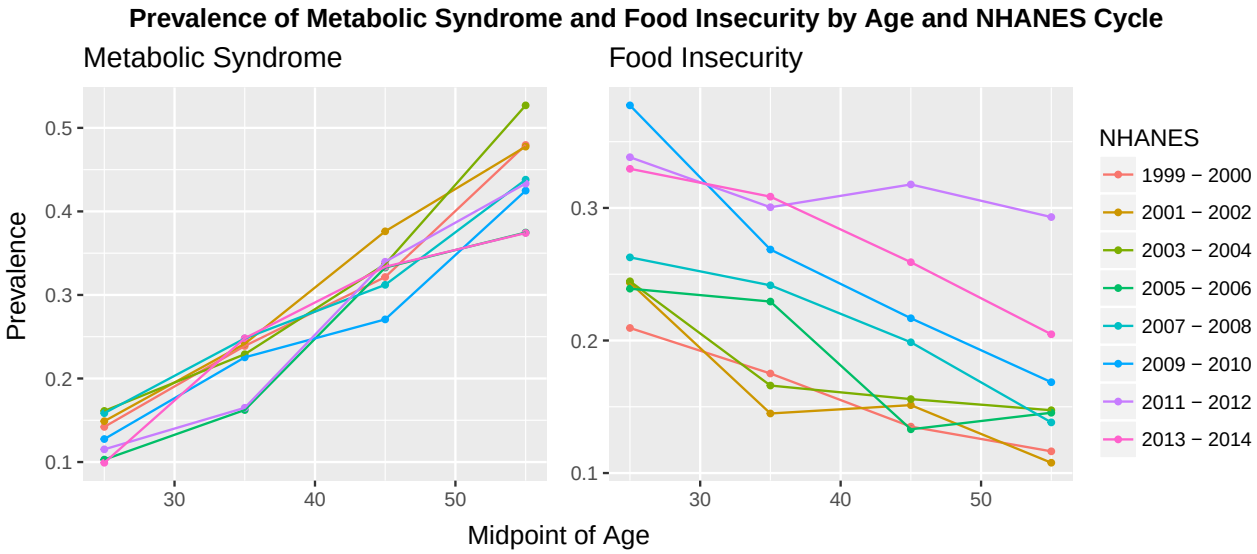
Table 3: Weighted Charactersitcs of Study Participants by Food Security Status

	Not Food Insecure	Food Insecure	p-value
	(n=88177828) N(%)	(n=22997275) N(%)	
Gender			1.00
Female	42872281(49)	11179567(49)	
Moderate Phys Act			<0.01
No	31515063(36)	9824629(43)	
Race			<0.01
Non-Hispanic White	67376239(76)	11878482(52)	
Mexican American	5656507(6)	3818366(17)	
Other Hispanic	3753298(4)	2180826(9)	
Non-Hispanic Black	7963019(9)	4482271(19)	
Other (including multiracial)	3428764(4)	637329(3)	
Education			<0.01
Less than 9th Grade	2359155(3)	2249538(10)	
9-11th Grade	7787500(9)	5147999(22)	
High School Grad	18563491(21)	6102111(27)	
Some College/AA	28338608(32)	7617569(33)	
College Graduate or above	31129074(35)	1880058(8)	
Income			<0.01
Under $20,000	10738495(12)	10047850(44)	
$20,000 - $54,999	27895252(32)	9972909(43)	
$55,000-$74,999	13673503(16)	1710333(7)	
$75,000 and Over	35870577(41)	1266183(6)	
Alcohol Use			<0.01
Never	9328890(11)	3048910(13)	
Moderate	42648439(48)	7914297(34)	
Heavy	36200499(41)	12034069(52)	
Smoking Status			<0.01
Never	50532364(57)	10343630(45)	
Former	19755416(22)	3542494(15)	
Current	17890047(20)	9111150(40)	
	Mean(SD)	Mean(SD)	
Age	42(0.3)	37(0.4)	<0.01

Table 4: Weighted Charactersitcs of Study Participants by Food Security Category

	Fully Food Secure	Marginal Food Security	Low Food Security	Very Low Food Security	p-value
	(n=88177828) N(%)	(n=8934150) N(%)	(n=8276011) N(%)	(n=5787114) N(%)	
Gender					0.90
Female	42872281(49)	4441789(50)	3973027(48)	2764751(48)	
Moderate Phys Act					<0.01
No	31515063(36)	3806635(43)	3568694(43)	2449300(42)	
Race					<0.01

	Fully Food Secure	Marginal Food Security	Low Food Security	Very Low Food Security	p-value
Non-Hispanic White	67376239(76)	4247902(48)	4213178(51)	3417402(59)	
Mexican American	5656507(6)	1633376(18)	1617242(20)	567748(10)	
Other Hispanic	3753298(4)	935038(10)	685617(8)	560171(10)	
Non-Hispanic Black	7963019(9)	1865360(21)	1509963(18)	1106949(19)	
Other (including multiracial)	3428764(4)	252474(3)	250010(3)	134845(2)	
Education					<0.01
Less than 9th Grade	2359155(3)	814175(9)	924848(11)	510514(9)	
9-11th Grade	7787500(9)	1641976(18)	2174825(26)	1331199(23)	
High School Grad	18563491(21)	2464206(28)	1926733(23)	1711172(30)	
Some College/AA	28338608(32)	3032930(34)	2566631(31)	2018008(35)	
College Graduate or above	31129074(35)	980862(11)	682974(8)	216221(4)	
Income					<0.01
Under $20,000	10738495(12)	3287677(37)	3675740(44)	3084433(53)	
$20,000 - $54,999	27895252(32)	4000244(45)	3551965(43)	2420701(42)	
$55,000-$74,999	13673503(16)	982134(11)	565526(7)	162673(3)	
$75,000 and Over	35870577(41)	664095(7)	482780(6)	119307(2)	
Alcohol Use					<0.01
Never	9328890(11)	1222689(14)	1088843(13)	737377(13)	
Moderate	42648439(48)	3045107(34)	2811894(34)	2057296(36)	
Heavy	36200499(41)	4666354(52)	4375274(53)	2992441(52)	
Smoking Status					<0.01
Never	50532364(57)	4352677(49)	3892901(47)	2098053(36)	
Former	19755416(22)	1547773(17)	1204353(15)	790368(14)	
Current	17890047(20)	3033700(34)	3178757(38)	2898693(50)	
	Mean(SD)	Mean(SD)	Mean(SD)	Mean(SD)	
Age	42(0.3)	37(0.6)	38(0.6)	37(0.8)	<0.01


Prevalence of Metabolic Syndrome and Food Insecurity by Age and NHANES Cycle
Metabolic Syndrome
Food Insecurity
Prevalence
0.5
0.4
0.3
0.2
0.1
30
40
50
Midpoint of Age
NHANES
1999 – 2000
2001 – 2002
2003 – 2004
2005 – 2006
2007 – 2008
2009 – 2010
2011 – 2012
2013 – 2014

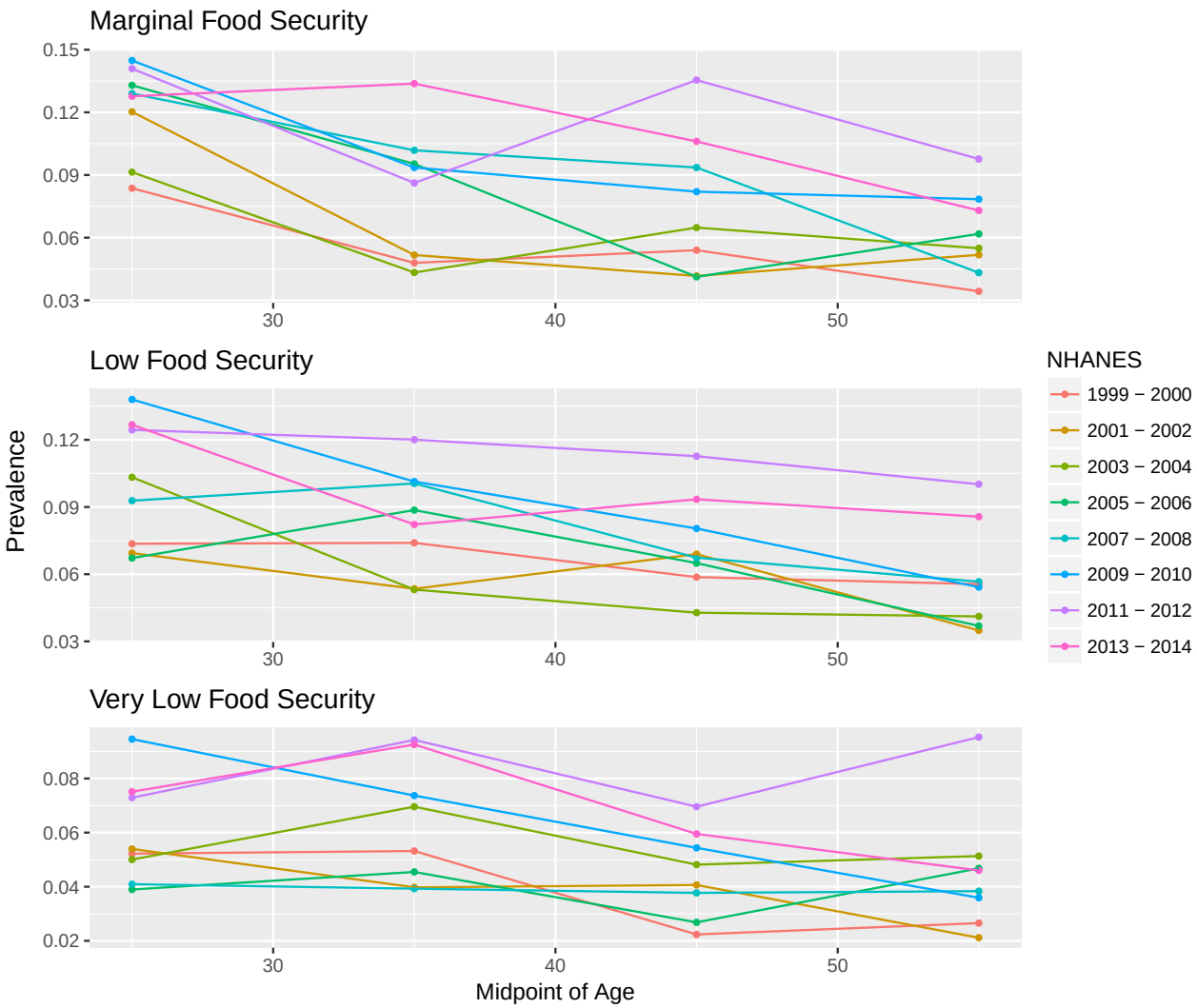

Prevalence of Food Security Categories by Age and NHANES Cycle
Marginal Food Security
Low Food Security
Very Low Food Security
Prevalence
0.15
0.12
0.09
0.06
0.03
0.08
0.04
0.02
30
40
50
Midpoint of Age
NHANES
1999 – 2000
2001 – 2002
2003 – 2004
2005 – 2006
2007 – 2008
2009 – 2010
2011 – 2012
2013 – 2014

Table 5: Unadjusted Prevalence and Relative Risk Ratio of Metabolic Syndrome

	Metabolic Syndrome (missing alc excl)	Metabolic Syndrome (missing alc not excl)
Unadjusted Prevalence		
Food Secure	0.29(0.27-0.30)	0.31(0.29-0.32)
Food Insecure	0.31(0.28-0.34)	0.33(0.30-0.36)
Crude Risk Ratio	1.06(0.96-1.17)	1.07(0.98-1.17)

Table 6: Unadjusted Prevalence and Relative Risk Ratio of Metabolic Syndrome

	Metabolic Syndrome (missing alc excl)	Metabolic Syndrome (missing alc not excl)
Unadjusted Prevalence		
Full food security	0.29(0.27-0.30)	0.31(0.29-0.32)
Marginal food security	0.29(0.25-0.34)	0.31(0.27-0.35)
Low Food security	0.31(0.27-0.36)	0.34(0.29-0.38)
Very low Food security	0.32(0.27-0.37)	0.34(0.29-0.39)
Crude Risk Ratio (vs full food security)		
Marginal food security	1.00(0.86-1.17)	1.02(0.90-1.15)
Low food security	1.08(0.94-1.24)	1.10(0.98-1.24)
Very low food security	1.10(0.93-1.31)	1.11(0.95-1.31)

Table 7: Adjusted Risk Ratio Metabolic Syndrome by Food Insecurity Status

	Adj RR	Adj RR not adj for alc
Male	1.08(0.78-1.50)	1.11(0.81-1.52)
Female	1.36(0.95-1.93)	1.37(1.01-1.85)

Table 8: Adjusted Risk Ratio Metabolic Syndrome by Food Security Category

	Males	Females
Adj RR (vs full food security)		
Marginal food security	1.11(0.63-1.96)	1.22(0.66-2.23)
Low food security	1.28(0.80-2.05)	2.14(1.35-3.38)
Very low food security	0.86(0.53-1.41)	1.36(0.77-2.39)
Adj RR not adj for alc (vs full food security)		
Marginal food security	1.11(0.65-1.89)	1.17(0.69-1.99)
Low food security	1.25(0.82-1.91)	1.94(1.31-2.87)
Very low food security	0.99(0.57-1.72)	1.49(0.84-2.63)

Discussion

Conculsions

References

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