A health system and health services research perspective on the use of BMI to diagnose and treat obesity

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David Arterburn, MD, MPH, FACP, FTOS, FASMBS
National Academy of Sciences Roundtable on Obesity Solutions
BMI and Beyond: Considering Context in Measuring Obesity and its Applications
April 4th, 2023

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How good are US health care systems at measuring BMI?

National Committee for Quality Assurance (NCQA) **Adult BMI Assessment** (ABA) Measure

% of adults 18–74 years who had an outpatient visit and whose BMI was documented during the past 2 years

ABA Measure Retired →

ABA Measure Launched →
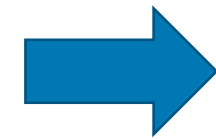
Measure Year	Commercial HMO	Commercial PPO	Medicaid HMO	Medicare HMO	Medicare PPO
2019	84.9	69.7	88.4	§	§
2018	82.5	71.4	86.6	96.2	96.3
2017	80.3	67.1	84.5	95.0	94.6
2016	76.6	62.9	80.7	94.2	91.8
2015	75.2	56.7	80.8	93.3	89.3
2014	75.9	49.4	79.9	92.9	90.0
2013	75.7	41.5	75.9	89.6	84.9
2012	66.1	35.2	67.5	80.8	75.3
2011	55.4	26.3	52.6	68.2	62.2
2010	40.7	11.6	42.2	50.4	36.6
2009	41.3	15.7	34.6	38.8	24.1

§ *Not available due to CMS suspension of data reporting during COVID-19 pandemic.*

Why was ABA retired?

1. Performance for Medicare has "nearly topped out" at 96%

2. BMI calculation in EMRs is automatic

3. To reduce reporting burden for plans

4. ABA does not assess counseling or follow-up for "at-risk" patients so "sets a low bar"

NCQA
Measuring quality.
Improving health care.

NCQA HEDIS **Weight Assessment** and Counseling for **Children/Adolescents** (WCC) Measure

BMI Percentile Assessment (3–17 Years)

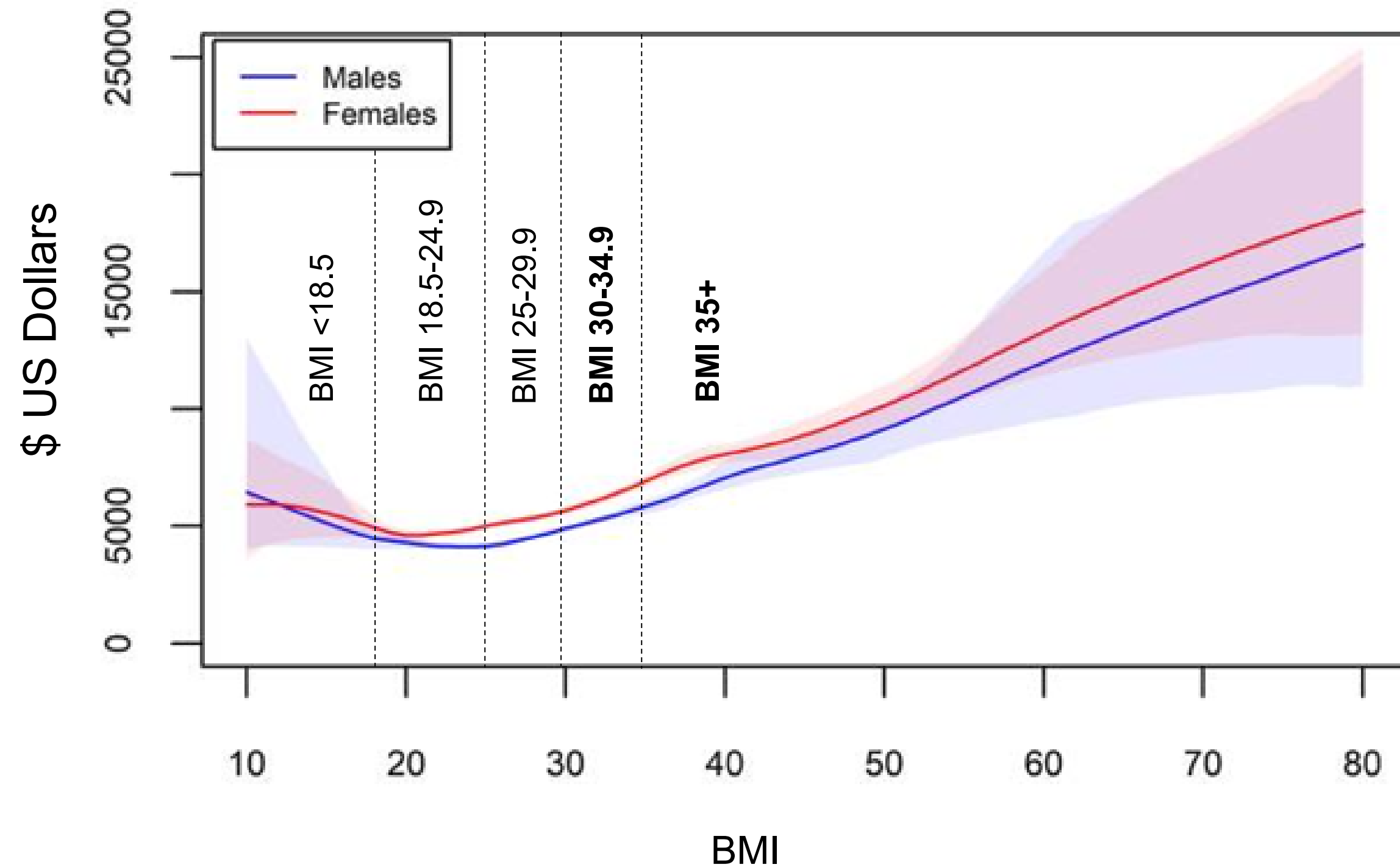| Measure Year	Commerical HMO	Commercial PPO	Medicaid HMO
2021	72.1	60.6	76.1
2020	65.9	58.5	74.5
2019	73.2	59.7	76.9
2018	72.6	60.9	74.3
2017	70.3	56.6	72.5
2016	65.2	52.0	69.1
2015	61.4	46.0	64.4
2014	61.3	40.0	64.0
2013	57.7	33.3	56.9
2012	51.6	31.2	51.8
2011	44.7	24.6	46.0
2010	35.2	10.9	37.3
2009	35.4	17.4	30.3

Most recent data →

WCC
Measure Launched →
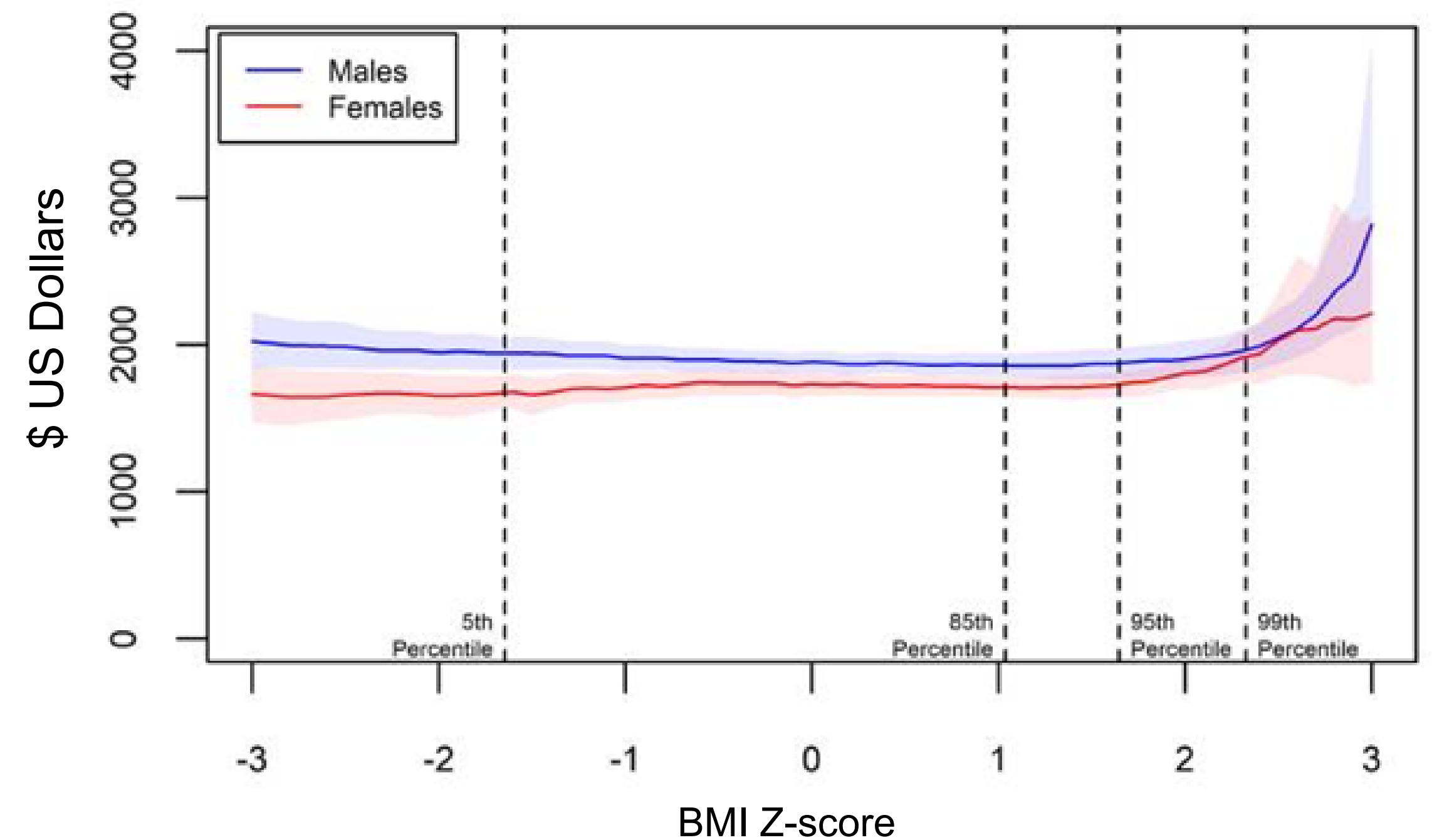
How does BMI relate to health care costs?

U.S. Medical Expenditure Panel Survey (MEPS) 2011-2016

Per capita annual expenditures, $ (2015)

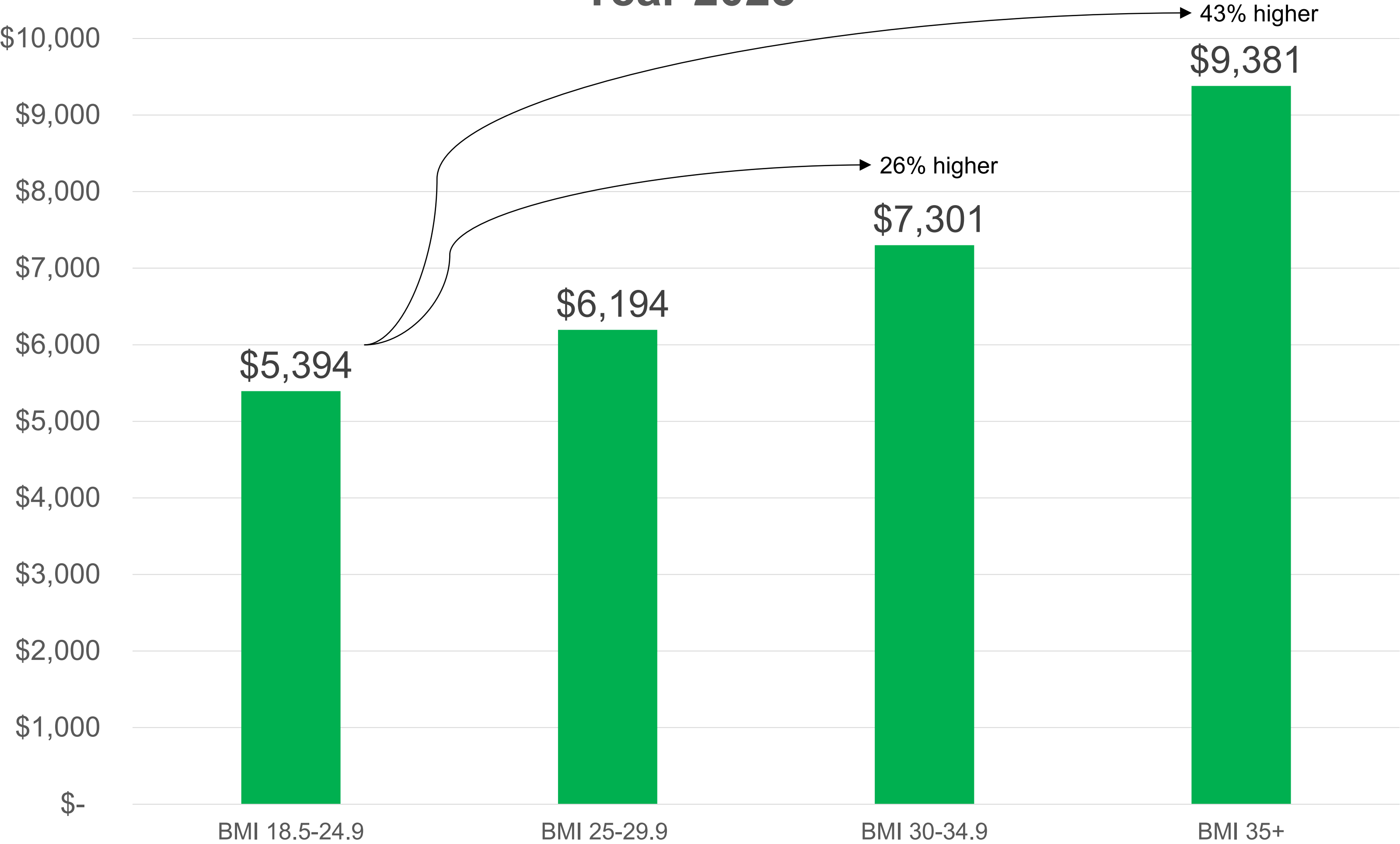A. Predicted Expenditure by BMI - Adults (20+)

B. Predicted Expenditure by BMI Z-Score - Children (6-19)

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Adult Per Capita Medical Expenditures by BMI, Year 2023*

43% higher

26% higher

$9,381

$7,301

$6,194

$5,394

| $10,000 |
| $9,000 |
| $8,000 |
| $7,000 |
| $6,000 |
| $5,000 |
| $4,000 |
| $3,000 |
| $2,000 |
| $1,000 |
| $- |

BMI 18.5-24.9   BMI 25-29.9   BMI 30-34.9   BMI 35+

*2023 costs inflation adjusted from 2015 estimates from Ward, et al. PLoS One. 2021, using https://www.bls.gov/data/inflation_calculator.htm

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Prevalence of BMI Categories; and Estimated Health Care Expenditures

Prevalence of BMI Categories

- 1.7%
- 17.3% — BMI 35+
- 26.4% — BMI 18.5-24.9
- 23.9% — BMI 30-34.9
- 30.7% — BMI 25-29.9

Percent of Health Care Costs by BMI Category

- 1.4%
- 23.9% — BMI 35+
- 21.0% — BMI 18.5-24.9
- 25.7% — BMI 30-34.9
- 28.0% — BMI 25-29.9
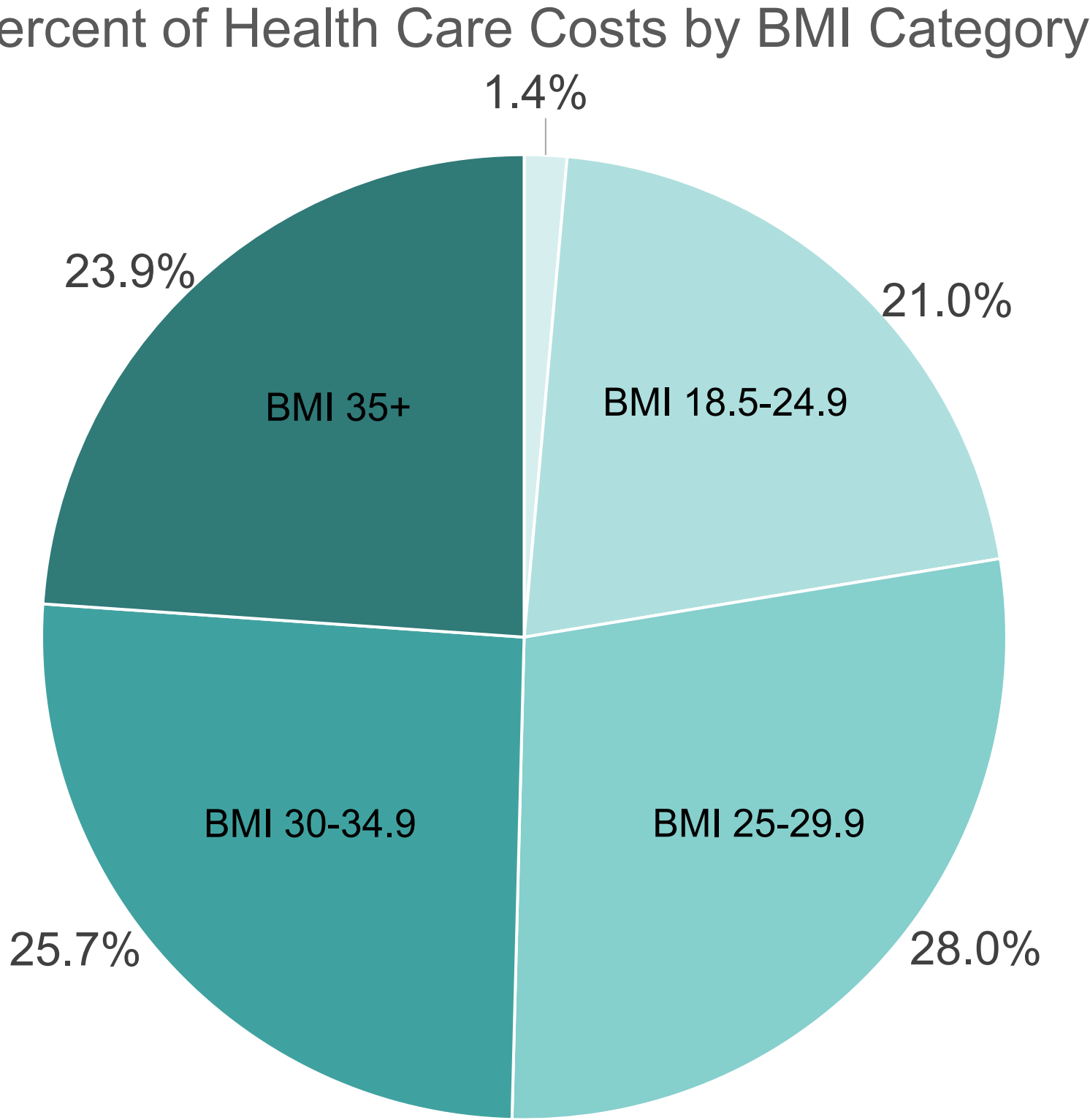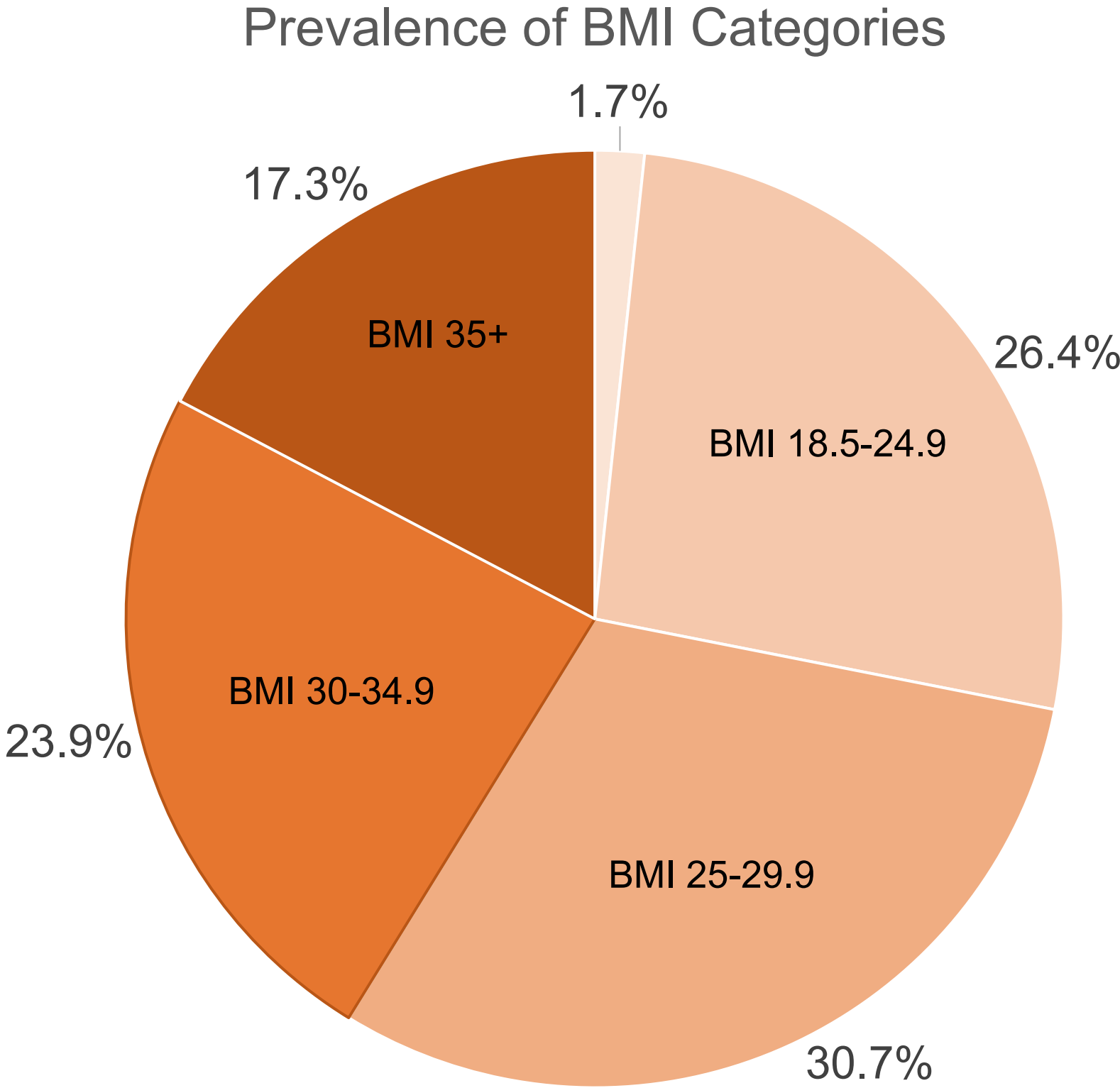
2023 prevalence in KPWA; BMI expenditure estimates from MEPS, Ward et al.

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What are the costs of alternative measures of adiposity?

Estimated Costs of Alternative Measures of Unhealthy/Visceral Adiposity

Measure	Cost per test*
Anthropometrics: Waist circumference, waist-to-hip ratio, sagittal diameter, etc.	**~$0** (after purchasing tape measure or stadiometer and training staff)
Laboratory Measure *(hypothetical, e.g., CRP, IL-6, adiponectin)*	**$100**
Whole body DEXA	**$200**
CT Abdomen	**$750**
MRI	**$1,250**

Cost estimates from Healthcare Bluebook

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Estimated Cost Impact of Implementing Alternative Adiposity Screening

Hypothetical health system similar in size to KP with 12.6 million members
84% age 20+; 24% BMI 30-34.9 = **3.0 million adults with BMI 30-34.9**
Assuming only 50% adherence/uptake

Measure	Cost per test	Cost of <u>Annual</u> Screening Adults BMI 30-34.9	Cost of Screening Adults BMI 30-34.9 <u>Every 5 Years</u>*
Anthropometrics	~$0	**~$0**	**~$0**
Laboratory Measure *(hypothetical)*	$100	**$150 Million/year**	**$30 Million/year**
Whole body DEXA	$200	**$300 Million/year**	**$60 Million/year**
CT Abdomen	$750	**$1.13 Billion/year**	**$226 Million/year**
MRI	$1,250	**$1.88 Billion/year**	**$376 Million/year**

If we get 100% adherence; we double our screening costs
If we also implement for BMI 25-29.9; we increase our screening costs by 125%

Unpublished rough estimates, Arterburn D

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Waist circumference (WC) measurement: knowledge, attitudes and barriers

'[WC] can be quite difficult in some patients' (PCP).

'It's personal to go up and start putting your arms around a patient' (Nurse).

'I think it's less invading for a patient to have them standing on a scale than to measure their waist circumference' (PCP).

Dunkley AJ, et al. Family Practice. 2009

"Although providers know that increased WC is related to cardiometabolic disease risk, they did not adopt it in practice. **Perceived barriers of time, provider discomfort, beliefs about patient discomfort, and practice norms strongly influenced rejection of WC measurement**."

Gaynor B, et al. J Nurse Practitioners. 2018

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What are the implications of BMI measures for the costs of obesity treatment?

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Obesity Treatment Guidelines and BMI

• **Comprehensive Lifestyle Intervention** is recommended for BMI ≥30, or BMI ≥25, with co-morbidities.*

• **Obesity Pharmacotherapy** should be considered for BMI ≥30, or BMI ≥27 with co-morbidities.*

• **Metabolic and bariatric surgery** (MBS) is recommended for BMI ≥35, regardless of presence, absence, or severity of co-morbidities.†

• **MBS** should be considered for individuals with metabolic disease and BMI of 30-34.9

• **Asian population (7.3% of US adults):** BMI thresholds should be adjusted such that BMI ≥27.5 kg/m² is indicator for treatment instead of BMI 30.†

Percent of US Adults Eligible for Treatment

- 35.0% — No treatment
- 15.0% — Comprehensive Lifestyle Intervention Alone
- 20.0% — Pharmacotherapy and//or Lifestyle Intervention
- 30.0% — Surgery and//or Pharmacotherapy/Lifestyle Intervention
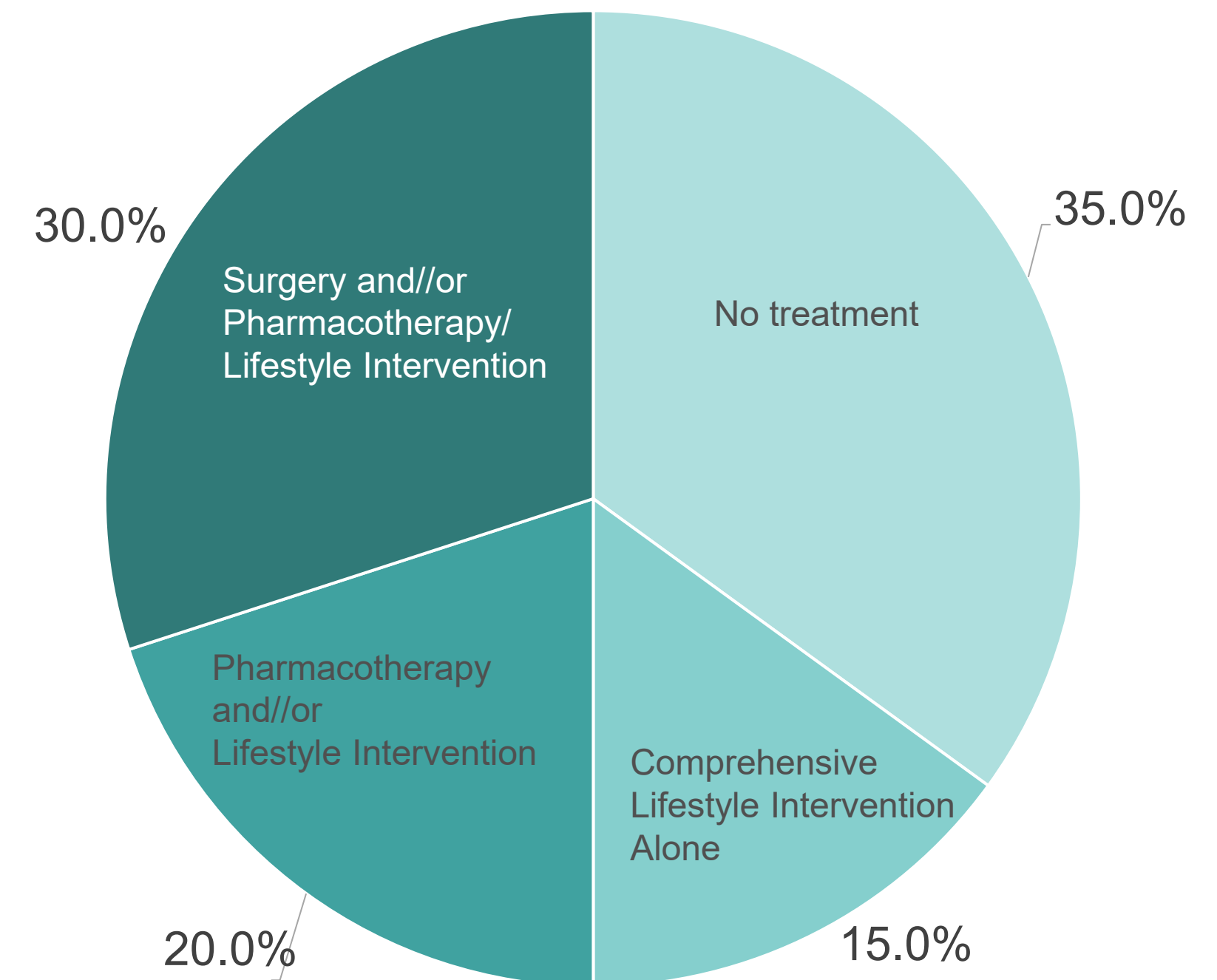
*2013 AHA/ACC/TOS Guideline
†2022 ASMBS Guideline
BMI Percentile estimates based on NHANES

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Estimated Costs of Obesity Treatment

Treatment	Cost/person/year
Intensive Lifestyle Intervention	**$200-720/year** (digital therapeutics)
Phentermine	**$60-240/year**
Phentermine-Topiramate ER	**$1200-1800/year**
Semaglutide	**$13,618/year**[†] After rebates and discounts (the "net price")
Tirzepatide	**$14,400-18,000/year**
Sleeve gastrectomy	**$27,312*** (initial hospitalization only; Commercial*) **$15,222** (Medicare reimbursement)
Gastric bypass	**$28,562*** (initial hospitalization only; Commercial*) **$16,264** (Medicare reimbursement)

†Baig K, et al. NEJM, 2023
*2017 Cost estimates using 2011-2017 Marketscan data

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Estimated Cost Impact of Implementing Obesity Treatment

Hypothetical health system similar in size to Kaiser Permanente
4.2 million adults with BMI 30+ (eligible for lifestyle; pharmacotherapy)
1.2 million adults with BMI 35+ (also eligible for metabolic/bariatric surgery)

Treatment	Cost/person/year	Cost if <u>only 5%</u> of eligible patients take the treatment*
Lifestyle Intervention	$200/year	**$42 Million**
Phentermine	$60/year	**$12.6 Million**
Phentermine-Topiramate ER	$1200/year	**$252 Million**
Semaglutide	$13,618/year† After rebates and discounts (the "net price")	**$2.9 Billion**
Tirzepatide	$14,400/year	**$3.0 Billion**
Sleeve gastrectomy	$27,312 (Commercial)	**$1.6 Billion**
Gastric bypass	$28,562 (Commercial)	**$1.7 Billion**

Unpublished rough estimates, Arterburn D

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Cost Impact of Phen-Top-ER and Semaglutide Treatment in Medicare Part D

The United States provides prescription drug coverage to 47 million adults under Medicare Part D

Potential Range of Medicare Costs for the Use of Antiobesity Medications.*							
Obesity Prevalence		Medication Users		Phentermine and Topiramate Cost		Semaglutide Cost	
Identification Method	People with Obesity (%)	People with Obesity Treated (%)	No. of Beneficiaries	Estimated Annual Total Cost ($)	Percentage of Part D Net Spending	Estimated Annual Total Cost ($)	Percentage of Part D Net Spending
CDC estimate of adults 60 years of age or older	41.5	1	196,764	131,832,183	0.09	2,679,538,309	1.85
		5	983,822	659,160,915	0.45	13,397,691,547	9.24
		10	1,967,645	1,318,321,829	0.91	26,795,383,094	18.48
		100	19,676,445	13,183,218,294	9.09	267,953,830,938	184.80

50% uptake of semaglutide would cost $133 Billion
This would exceed the entire Part D budget, which is $119 Billion in 2023

†Baig K, et al. NEJM, 2023

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Conclusions:

- Health systems do a very good job of capturing BMI currently
- But there is large heterogeneity in adiposity-related risk, particularly for BMI <35
- From a practical, population health standpoint, instead of broadening obesity treatment criteria (and treating more people, some with uncertain benefit), we need to better focus our criteria on those most likely to benefit (i.e., narrow our criteria)
- Additional adiposity-risk screening measures <u>are needed</u> to identify patients at the highest risk of adiposity related complications <u>and</u> those most likely to benefit from weight loss
- However, additional adiposity measures are likely to be expensive and/or difficult to implement (e.g., WC)
- It probably won't help to better identify people at risk <u>if</u> we can't afford to offer them treatment. Even a 5% increase in treatment carries substantial costs to our health systems.

Key Unanswered Questions:

If we are going to propose additional screening tests above and beyond BMI…

1. Do we have strong evidence that these tests identify people at higher risk of adiposity-related disease?

2. How acceptable are these tests to patients and providers? How effective are we at implementing these tests? How much do they cost?

3. Will we need new studies of lifestyle, pharmacotherapy, and surgery to demonstrate the efficacy, safety, and cost-effectiveness of treatment in these new sub-populations?