

Kaiser Permanente Research Brief

Obesity

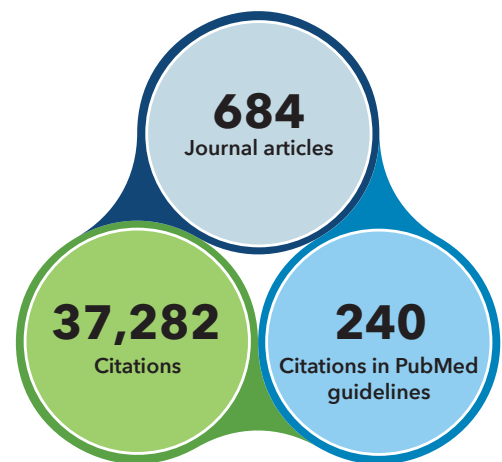
This brief summarizes the contributions of Kaiser Permanente Research since 2007 on the topic of obesity, including risk factors, strategies for improving member health and well-being, and translation of research into policy and practice.

Obesity is a common but serious health condition defined by high weight relative to a person's height. Weight-to-height ratios are measured using the BMI (or body mass index) scale. In general, a BMI of 18.5 to 24.9 is considered a healthy weight. BMIs in the range of 25 to 29.9 are classified as overweight, and BMIs of 30 or greater are classified as obese.¹ According to the National Center for Health Statistics, more than 42% of U.S. adults are obese,² and obesity prevalence among children age 2 to 19 is 18.5%.³

Obesity is an active area of study for Kaiser Permanente Research. Scientists across the organization have used our rich, comprehensive, longitudinal data to advance knowledge in the areas of understanding risk, improving patient outcomes, and translating research findings into policy and practice. We have published more than 680 articles related to obesity since 2007.⁴ Together, these articles have been cited over 37,000 times.

These articles are the product of observational studies, randomized controlled trials, meta-analyses, and other studies led by Kaiser Permanente scientists. Our unique environment – a fully integrated care and coverage model in which our research scientists, clinicians, medical groups, and health plan leaders collaborate – lets us contribute generalizable knowledge on obesity, and many other research topics.

Kaiser Permanente publications related to obesity since 2007



Source: Kaiser Permanente Publications Library and Scite metrics, as of November 29, 2021.

This brief summarizes a selection of the publications contained within the Kaiser Permanente Publications Library, which indexes journal articles and other publications authored by individuals affiliated with Kaiser Permanente. The work described in this brief originated from across Kaiser Permanente's 8 regions and was supported by a wide range of funding sources including internal research support as well as both governmental and nongovernmental extramural funding.

Understanding Risk

Kaiser Permanente researchers have contributed to understanding the risk of developing obesity, as well as the other health risks that people with obesity face.

Who is at risk for developing obesity?

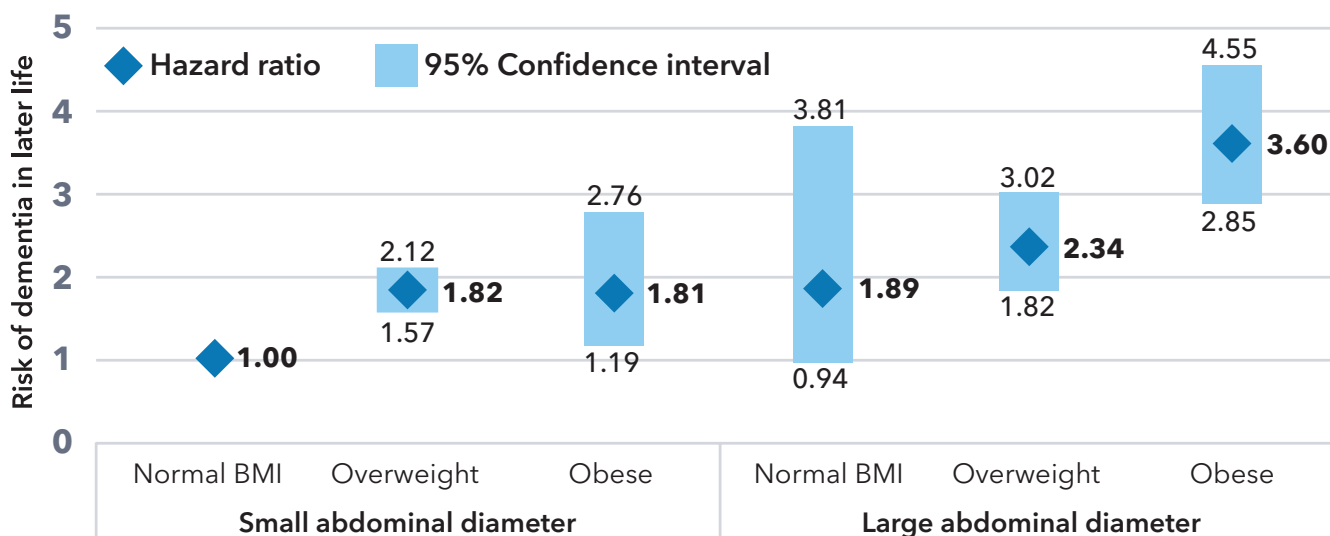
Obesity risk is present throughout a person’s lifespan, and no one is immune to obesity. Our researchers have identified a host of specific risk factors for overweight and obesity. These include food-related factors (such as eating patterns, the food and food culture at home and in the community, and availability or affordability of healthy and unhealthy eating options),⁵⁻¹⁴ physical activity behaviors and sedentary time (for example, television and screen time),¹⁵ and genetic factors.¹⁶⁻²⁰ For children, growing up in a household with overweight and obese adults is a risk factor.^{21;22} Kaiser Permanente scientists have also linked the quality of infants’ diets with their risks for overweight and obesity in early childhood.²³ Recent data also suggest a significant increase in pediatric obesity during the COVID-19 pandemic.²⁴ Obesity is also associated with factors for which the causal pathway is not entirely clear, such as sleep duration and sleep quality.²⁵⁻²⁹

Obesity prevalence is higher among certain racial and ethnic populations, a difference that is attributed to a mix of genetic and nongenetic factors.^{16;30-33}

What other health risks do people with obesity face?

People with obesity experience a range of health risks. Among the most pervasive and well-known are cardiovascular and metabolic diseases,^{16;34-38} select cancers,³⁹⁻⁴³ lower-extremity injuries,⁴⁴⁻⁴⁷ breathing and sleep disturbances such as sleep apnea or chronic obstructive pulmonary disease,^{16;39;48-53} and excess mortality,⁵⁴ including mortality associated with COVID-19.⁵⁵ In the Patient Outcomes Research to Advance Learning Network’s overweight and obesity cohort,⁵⁶ and in other studies, our researchers have described specific cardiometabolic risks that are known to be frequently present among people who are overweight or obese. These include elevated blood pressure; elevated levels of low-density lipoprotein cholesterol (or LDL-C), triglycerides, fasting plasma glucose, and C-reactive protein; and low levels of high-density lipoprotein cholesterol (HDL-C or “good cholesterol”).^{57;58} Other research conducted by our scientists has found links between maternal obesity and excessive

Central obesity in midlife is an independent risk factor for dementia in later life. Compared to adults with normal BMI and small abdominal diameter, overweight and obese adults were more likely to develop dementia. For those with both obesity and large abdominal diameter, the risk of dementia was 3.6 times higher.⁷³



gestational weight gain, and health risks⁵⁹⁻⁶¹ including gestational diabetes and persistent weight concerns for the mother after pregnancy,⁶²⁻⁶⁴ as well as overweight and obesity in the child.⁶⁵⁻⁷²

Kaiser Permanente researchers are also contributing to knowledge about a host of newly emerging risks, such as the link between obesity and dementia, including Alzheimer's disease.⁷³⁻⁷⁵ Other risks associated with obesity that our researchers have investigated include depression or social isolation,¹⁶ anxiety,⁷⁶ experiences of bias and bullying,^{16,77} and reduced quality of life and physical functioning.^{46;78;79}

Obesity can also affect the treatment of other conditions. Kaiser Permanente researchers have described uncertainty in correct dosing of certain medications for obese people, such as chemotherapies⁸⁰ or heparin.⁸¹ Women with obesity may also be less likely to complete recommended gynecologic cancer screening⁸² and mammography.^{83;84}

Improving Patient Outcomes

What strategies are effective in preventing obesity?

Preventing obesity is a critical strategy to curb the growth in the absolute numbers of people who are overweight and obese globally, which are projected to reach 2.16 billion and 1.12 billion respectively by 2030.⁸⁵ A nutritious diet and adequate physical activity are beneficial for people in all weight groups and contribute to obesity prevention.^{86;87} Researchers have also linked inadequate sleep with obesity, suggesting another behavioral factor in preventing obesity.^{27;28}

Our researchers have contributed to the growing evidence supporting methods to encourage behavior change and weight maintenance, irrespective of weight status.⁸⁸⁻⁹¹ Kaiser Permanente physicians and researchers have implemented "Exercise as a Vital Sign" within the organization's electronic health record system, which incorporates physical activity questions into every routine outpatient visit and prompts clinicians to offer brief counseling to maintain healthy behaviors and modify unhealthy ones.⁹²⁻⁹⁶ However,

Strategies for weight maintenance and weight loss



there are many barriers to consistently screening for physical activity and delivering the brief intervention,⁹⁶ and further work is needed to improve consistent follow-through.

One special population in which weight control is of heightened importance is pregnant women. Our scientists have found that pregnant women, regardless of their prepregnancy weight, often do not receive advice regarding physical activity from their health care providers.⁹⁷ Among women who are already overweight or obese, Kaiser Permanente researchers have studied interventions designed for weight loss before becoming pregnant,⁹⁸ as well as dietary interventions during pregnancy to limit gestational weight gain.^{99;100}

How does early identification of obesity affect outcomes?

Routine screening is used to identify people who are overweight or obese, and is recommended for children, adolescents, and adults based on the availability of effective treatments.^{16;101;102} Early identification of unhealthy weight gain may have additional importance because there is evidence that the human body adapts to and defends its excess weight, counteracting calorie restrictions and other dietary changes.^{103;104} Furthermore, after obesity has persisted for some time, biological adaptations are triggered that act on fat storage capacity and dopamine signaling, which helps control the brain's reward

and pleasure centers, triggering food overconsumption.¹⁰³ As such, the treatment of obesity grows increasingly difficult the longer obesity has persisted.

What are the key factors in effective treatment of obesity?

People who are overweight or obese can modify their behaviors, habits, and environment to improve their health in many ways.¹⁰⁵ For people with obesity and other common co-occurring conditions, even a very modest amount of weight loss can have important health benefits. For example, studies have found that weight loss is associated with declines in stress and depression,¹⁰⁶ with improved blood pressure,¹⁰⁷ with improvements in symptoms among obese adults with asthma,¹⁰⁸ and with reduced risks for some forms of cancer.¹⁰⁹

Behavior change: For people who are overweight or obese, dietary changes are a key factor in weight loss.^{9;110-112} In particular, adopting low-carbohydrate diets,¹¹¹ decreasing intake of other energy-dense foods,¹¹⁰ and reducing consumption of liquid calories (such as from sugar-sweetened beverages)⁹ can be effective dietary strategies. These changes can be combined with increased intake of fruits and vegetables, low-fat dairy products, and other foods low in energy density and high in fiber.¹¹²

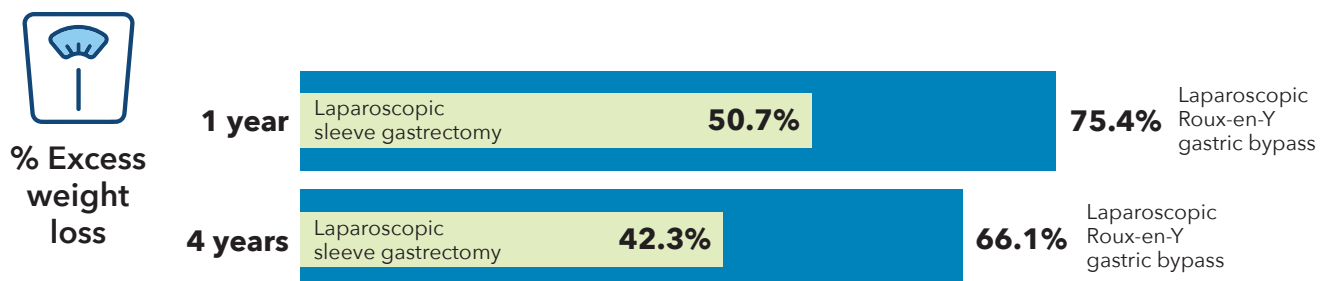
Increasing physical activity – in combination with nutritional changes – can also contribute to weight loss and weight maintenance.^{113;114} More-

over, physical activity is important for people with obesity even if it doesn't result in weight loss. Our researchers have shown that people who are both obese and active are healthier in terms of important cardiometabolic factors than people who are obese and inactive.¹¹⁵

Our researchers have studied a range of evidence-based behavioral interventions to address obesity – such as the Diabetes Prevention Program, Weight Watchers, and others¹¹⁶⁻¹¹⁸ – and have concluded that there is strong support for the efficacy and effectiveness of such programs.¹¹⁹ Some of the key behavior changes taught in these programs that are associated with maintaining a significant amount of weight loss over time include food and physical activity journaling; cooking most meals at home (not eating out); weighing oneself regularly (daily or every other day); and setting a baseline for physical activity that is 2 to 3 times more than the standard recommendation of 30 minutes per day/5 days per week.^{113;120-126} Patients have also reported that social support is key for weight maintenance, leading to the recommendation that weight loss programs consider involving family and friends to support long-term success.^{122;127}

Surgical approaches: Weight-loss surgeries are a complement to behavior change approaches for treating obesity.¹²⁸ Our researchers have shown that, for people with obesity and diabetes, bariatric surgery was associated with substantial weight loss compared to nonsurgical approaches, and also resulted in better odds of diabetes remission¹²⁹ and reduced risks

Older adults who had gastric bypass experienced greater weight loss at 1 and 4 years than those who had sleeve gastrectomy. However, the complication rate for gastric bypass was higher (30.5% vs. 15.4%).¹³⁸



for microvascular complications of diabetes,¹³⁰ cardiovascular or cerebrovascular events,¹³¹ and some types of obesity-related cancer.^{132;133} Kaiser Permanente researchers have described the comparative effectiveness and complication rates of various types of weight-loss surgeries,¹³⁴⁻¹³⁷ and described differences in outcomes according to procedure type, age at time of surgery, level of obesity before surgery, and other factors.¹³⁸⁻¹⁴¹ The benefits of bariatric surgery appear to be durable over time for many, but not all, patients.¹⁴²⁻¹⁴⁴ However, there is evidence of differences between racial and ethnic groups in outcomes after bariatric surgery (such as resolution of metabolic syndrome and overall weight loss), and evidence that surgery is more effective for younger and less obese patients.¹⁴⁵⁻¹⁴⁷

Children: Screening and early intervention are particularly important in children, since obesity during childhood and adolescence is predictive of obesity as an adult.¹⁴⁸ Treatment of obesity in children differs from treatment of adults, because children are often reliant on others (parents, other family members, or school staff) for their nutrition, access to or engagement in physical activity, and other factors.

Our researchers have conducted a number of studies testing models to improve physical activity and nutrition in schools,¹⁴⁹⁻¹⁵¹ developed an instrument for assessing the home environment,¹⁵² tested phone counseling for parents of overweight children,¹⁵³ and created other parent-focused approaches.¹⁵⁴ In recent years, evidence to support effectiveness of behavioral interventions for weight management among children and adolescents has emerged, and routine screening for obesity in youth is now recommended.^{16;101}

Translating Research Into Policy and Practice

Kaiser Permanente is a learning health care organization that works to systematically use research to inform and improve practice both within and outside Kaiser Permanente. Research, clinical, and operational partners within Kaiser Permanente have tested a range of interventions to reduce the risk of obesity and improve outcomes for people with obesity. We have reviewed the evi-

dence for intensive behavioral weight-loss counseling programs delivered in person and by telephone, and by a range of interventionists, such as primary care providers, dietitians, and medical assistants.¹⁵⁵⁻¹⁶⁰ We have implemented “Exercise as a Vital Sign”⁹²⁻⁹⁶ in our electronic health record system, and continue to encourage clinicians to engage with patients of all weights to promote healthy habits. Kaiser Permanente has also invested in community health initiatives that promote obesity-prevention policies and environmental changes in the communities we serve.¹⁶¹⁻¹⁶⁵ More recently, we have studied the implementation of a program aimed at improving physical activity among patients following bariatric surgery,¹⁶⁶ as well as a lifestyle-based telehealth intervention to reduce excess gestational weight gain during pregnancy.¹⁶⁷ Our researchers have participated in studies assessing obesity prevention programs based in the workplace and at schools, as well as community-level environmental and policy changes such as healthier offerings in vending machines and cafeterias.^{161;162;168-172} These studies have suggested that site-based interventions must be high intensity to be effective at a population level.¹⁶⁵

Kaiser Permanente’s research on obesity since 2007 has been cited 240 times in consensus statements and clinical practice guidelines. Guidelines citing our research have been published by a wide range of entities, including the American Society for Metabolic and Bariatric Surgery, the American Association of Clinical Endocrinology, and the American Heart Association. In addition, our researchers and clinician scientists have directly contributed as authors of guidelines for the management of overweight and obesity,^{102;173-176} routine assessment of physical activity in health care,⁹⁶ and screening for obesity in children and adolescents.^{16;101} Kaiser Permanente has also participated in the Obesity Medicine Education Collaborative, an effort to improve medical education related to obesity management through the development of new standards and benchmarks.¹⁷⁷ Our scientists are also leaders of the National Institutes of Health’s Environmental Influences on Child Health Outcomes program, a long-term national initiative investigating relationships between factors in a child’s early life and the subsequent devel-

opment of obesity.¹⁷⁸ Finally, researchers in our Colorado Region are participants in the Childhood Obesity Data Initiative, an effort to further research in pediatric obesity by integrating electronic health record data from multiple community-based health care organizations.^{179;180}

Kaiser Permanente's 185 research scientists and 1,530 support staff are based at 9 research centers. There are currently 2,355 studies underway, including clinical trials. Since 2007 our research scientists have published more than 19,000 articles in peer reviewed journals. Kaiser Permanente currently serves approximately 12.5 million members in 8 states and the District of Columbia.

This brief was written by Nicholas P. Emptage, Anna C. Davis, and Elizabeth A. McGlynn. It is available online from about.kaiserpermanente.org/our-story/health-research/research-briefs. The authors wish to thank the following researchers for their contributions to the development of this brief: David E. Arterburn and Deborah R. Young.

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