

# Obesity Reduction Within a Generation: The Dual Roles of Prevention and Treatment

Joyce M. Lee<sup>1,2</sup> and Hedwig Lee<sup>3</sup>

In 2010, the White House Task Force on Childhood Obesity provided benchmark goals for reducing childhood obesity. We evaluated the balance of prevention and treatment required for achieving Task Force goals in benchmark years 2015, 2020, and 2030. We created a simulation of US birth cohorts (2–19 years) born 2008–2030. For each year, we assumed “old” birth cohorts (part of previous benchmark obesity estimates) would benefit from obesity treatment strategies, and “new” birth cohorts would benefit from obesity prevention strategies. We assessed obesity prevalence that must be achieved through prevention strategies, under varying assumptions of treatment effectiveness. When we assumed a 1% absolute reduction in prevalence through treatment, we found that prevention strategies would need to achieve an obesity prevalence of 12% by 2015, 8% by 2020, and 0.3% by 2030. Because of higher obesity prevalence among minority children, prevention strategies would need to achieve a negative prevalence by 2030, which is implausible. Under more generous assumptions of treatment effectiveness, estimates became positive but remained low. Task Force goals are more difficult to achieve with each benchmark year. Policies must focus on obesity treatment interventions, particularly targeted to racial/ethnic minority children, to make progress in stemming the epidemic.

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In May 2010, the White House Task Force on Childhood Obesity presented the country with a plan for solving the problem of childhood obesity within a generation (1). The report was the first to provide benchmarks for assessing progress in efforts to “bend” the curve of childhood obesity. Starting with a baseline prevalence of 16.9% in 2007–2008 (2), the Task Force recommended an absolute reduction of obesity rates of 2.5% by 2015, another 2.5% reduction by 2020, and the return of prevalence to a baseline level of 5% by 2030.

To achieve these goals, both obesity prevention and treatment strategies are required. Prevention alone cannot tackle the epidemic given the substantial burden of children already classified as obese. Likewise, treatment alone will not be sufficient if obesity incidence remains high among future cohorts of children. It is critical for policymakers to better understand the optimal balance between approaches. Recent generational patterns of obesity for the US pediatric population and for specific racial/ethnic groups will have direct implications for determining the balance required to reach these policy goals.

## METHODS

Our intention was to provide basic calculations for general guidance about the steps needed to feasibly reach benchmark goals. Although we considered constructing a more sophisticated dynamic model of obesity, we chose to create a simple static model as we felt that using

measures of obesity prevalence, rather than incidence, would be more readily accessible to clinicians and policymakers.

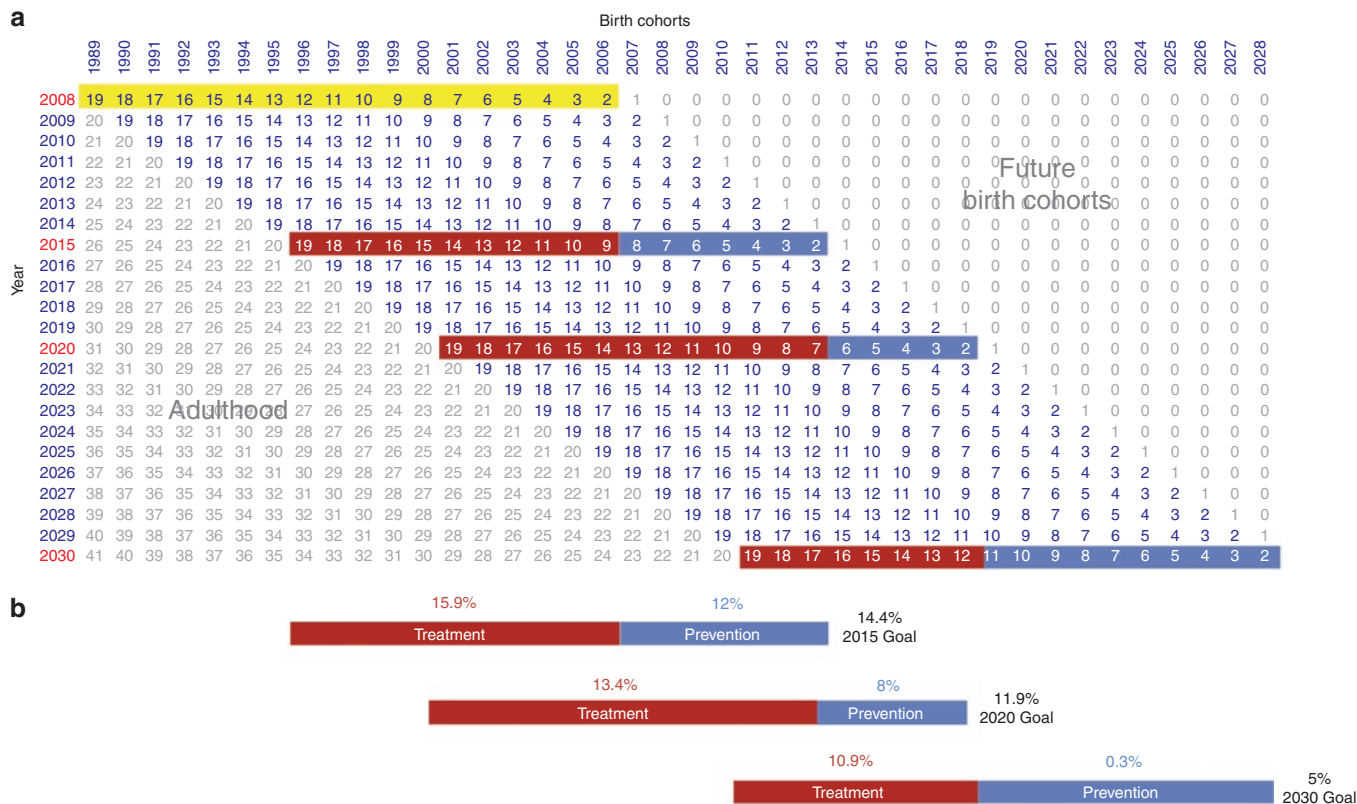
Figure 1a shows a schematic of current and future generations of US children. Rows represent calendar years, columns represent birth cohorts (1989–2028) and numbers within the grid represent age. Baseline estimates of childhood obesity (2–19 years) for 2008 were based on cohorts born in 1989–2006 (yellow highlights). By 2015, the first benchmark year, cohorts born in 1989–1995 will have aged out and become part of the adult population. Cohorts born in 1996–2006, who were part of the 2008 estimate, will remain part of the 2015 estimate, which we refer to as “old” cohorts (red highlights). Also included in the 2015 estimate are individuals from “new” cohorts (born in 2007–2013), (blue highlights) who were <2 years-old or were not yet born in 2008. “Old” and “new” cohorts are identified for each benchmark year.

We assumed no further obesity incidence among nonobese individuals from the “old” cohorts. Therefore, absolute reductions in obesity prevalence would occur only as a result of obesity treatment strategies among children already obese. In contrast, “new” cohorts would benefit solely from obesity prevention strategies for nonobese children. The weighted average of obesity prevalence achieved by “old” and “new” cohorts represents the balance of prevention and treatment necessary to achieve the benchmark goals.

For example, overall prevalence estimates achieved for 2015 are the weighted average of prevalence ( $P$ ) of obesity achieved through prevention ( $P_{\text{Prevention2015}}$ ) and through treatment ( $P_{\text{Treatment2015}}$ ). We use the following equation, which weights the estimates to account for the proportion of “old” and “new” cohorts in the sample ( $n_{\text{Old Cohorts}} = 11$  and  $n_{\text{New Cohorts}} = 7$  for 2015,  $n_{\text{Old Cohorts}} = 13$  and  $n_{\text{New Cohorts}} = 5$  for 2020, and  $n_{\text{Old Cohorts}} = 8$  and  $n_{\text{New Cohorts}} = 10$  for 2030):

<sup>1</sup>Division of Pediatric Endocrinology, University of Michigan, Ann Arbor, Michigan, USA; <sup>2</sup>Child Health Evaluation and Research (CHEAR) Unit, University of Michigan, Ann Arbor, Michigan, USA; <sup>3</sup>Department of Sociology, University of Washington, Seattle, Washington, USA. Correspondence: Joyce M. Lee (joyclee@umich.edu)

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**Figure 1** Schematic of current and future generations of US children from 2008 through 2030. **(a)** A schematic of current and future generations of US children. Rows represent calendar years, columns represent birth cohorts (1989–2028) and numbers within the grid represent age. Baseline estimates of childhood obesity (2–19 years-old) for 2008 were based on cohorts born in 1989 and 2006 (yellow highlights). By 2015, the first benchmark year, cohorts born between 1989 and 1995 will have aged out and become part of the adult population. Cohorts born between 1996 and 2006, who were part of the 2008 estimate, will remain part of the 2015 estimate, so-called “old” cohorts (red highlights). Also included in the 2015 estimate are individuals from “new” cohorts (born between 2007 and 2013) (blue highlights) who were <2-years-old or were not yet born in 2008. Analogously, “old” and “new” birth cohorts can be identified for each of the subsequent proposed benchmark years of 2020 (birth cohorts 2001–2013 and 2014–2018), and 2030 (birth cohorts 2011–2018 and 2019–2028). **(b)** A simplified schematic of cohorts with sample calculations. Shown in blue are the estimates of obesity prevalence that need to be achieved through prevention efforts, assuming 1% treatment effectiveness. For example, obesity prevalence in 2008 was 16.9% and would decrease to 15.9% with treatment for the “old” cohorts for 2015. To achieve the Task Force goal of 14.4% by 2015, prevention efforts would need to achieve an obesity prevalence of 12% for the “new” cohorts. Assuming that the goal prevalence for 2015 was achieved, obesity prevalence in 2020 for the “old” cohorts would decrease to 13.4%. To achieve the Task Force goal of 11.9% by 2020, prevention efforts would need to achieve an obesity prevalence of 8% for the “new” cohorts. Finally, assuming that the goal prevalence for 2020 was achieved, obesity prevalence in 2030 for the “old” cohorts would decrease to 10.9%. To achieve the Task Force goal of 5.0% for 2030, prevention efforts would need to achieve an obesity prevalence of 0.3%, a relatively ambitious goal.

$$P_{\text{Benchmark year}} = \frac{(P_{\text{Treatment}} \times n_{\text{Old Cohorts}}) + (P_{\text{Prevention}} \times n_{\text{New Cohorts}})}{n_{\text{All Cohorts}}}$$

We first assumed that obesity treatment leads to a 1% absolute reduction in prevalence for the “old” cohort (Figure 1b). Therefore,  $P_{\text{Treatment2015}}$  would be 15.9%, a 1% absolute reduction from the 16.9% in 2008 (2), and  $P_{\text{Benchmark2015}}$  is 14.4%, the 2015 Task Force goal. For 2020, assuming 2015 goal prevalence was achieved and a 1% absolute treatment reduction,  $P_{\text{Treatment2020}}$  would be 13.4% and the 2020 Task Force goal,  $P_{\text{Benchmark2020}}$  is 11.9%. Prevention efforts would therefore need to achieve a  $P_{\text{Prevention2020}}$  of 8% ( $11.9\% = ((13.4\% \times 13) + (8\% \times 5))/18$ ). Finally, for 2030,  $P_{\text{Treatment2030}}$  would be 10.9% and the 2030 Task Force goal,  $P_{\text{Benchmark2030}}$  is 5.0%. Prevention efforts would therefore need to achieve a  $P_{\text{Prevention2030}}$  of 0.3% ( $5\% = ((10.9\% \times 8) + (0.3\% \times 10))/18$ ).

We also assume differing levels of absolute treatment effectiveness, ranging from 2 to 6%. Table 1 displays the obesity prevalence that prevention efforts would need to achieve to reach the Task Force goals for each of the benchmark years under each assumption. Even under optimal conditions in which obesity treatment results in a 6% reduction in prevalence,

prevention efforts must achieve a prevalence of 4.3% in order to meet the Task Force goals. Although our assumptions about treatment effectiveness could be considered conservative, overall reductions in childhood obesity prevalence have not occurred, but instead have plateaued (2), and recent meta-analyses evaluating the efficacy of treatment interventions for pediatric obesity reveal only small-to-moderate treatment effects for short-term BMI reduction (3,4).

Given substantial racial/ethnic disparities in obesity, we performed calculations to examine the balance of treatment and prevention needed to achieve benchmark goals for minority children (Table 1). Estimates of obesity prevalence (for “new” cohorts) by 2030 remained in the 1% range or implausible (i.e., negative estimates) for black and Mexican-American children even under generous assumptions of treatment effectiveness.

**DISCUSSION**

Our evaluation of the Task Force goals highlights the necessity of pursuing dual strategies of treatment and prevention for tackling the epidemic. Because of the heavy burden of obesity in the current pediatric population, particularly for minority

**Table 1 Obesity prevalence estimates that must be achieved through prevention efforts to reach Task Force goals**

	Prevalence goals	Goal year	Reductions in obesity prevalence related to treatment					
			-1%	-2%	-3%	-4%	-5%	-6%
Overall (baseline 16.9%)	14.4%	2015	12.0%	13.6%	15.2%	16.8%	18.3%	19.9%
	11.9%	2020	8.0%	10.6%	13.2%	15.8%	18.4%	21.0%
	5%	2030	0.3%	1.1%	1.9%	2.7%	3.5%	4.3%
Whites <sup>a</sup> (baseline 15.3%)	12.8%	2015	10.4%	12%	13.6%	15.2%	16.7%	18.3%
	10.3%	2020	6.4%	9%	11.6%	14.2%	16.8%	19.4%
	5%	2030	1.6%	2.4%	3.2%	4.0%	4.8%	5.6%
Blacks <sup>a</sup> (baseline 20%)	17.5%	2015	15.1%	16.7%	18.3%	19.9%	21.4%	23.0%
	15%	2020	11.1%	13.7%	16.3%	18.9%	21.5%	24.1%
	5%	2030	<b>-2.2%</b>	<b>-1.4%</b>	<b>-0.6%</b>	0.2%	1.0%	1.8%
Mexican-Americans <sup>a</sup> (baseline 20.8%)	18.3%	2015	15.9%	17.5%	19.1%	20.7%	22.2%	23.8%
	15.8%	2020	11.9%	14.5%	17.1%	19.7%	22.3%	24.9%
	5%	2030	<b>-2.8%</b>	<b>-2.0%</b>	<b>-1.2%</b>	<b>-0.4%</b>	0.4%	1.2%

The table shows the obesity prevalence that prevention efforts would need to achieve to reach the Task Force goals for each of the benchmark years under varying assumptions of treatment effectiveness (reductions range from 1 to 6%). Values in bold are implausible (negative) values for obesity prevalence, which indicates that even if we completely eradicated obesity incidence for “new” cohorts in 2030, goal prevalence would not be reached.

<sup>a</sup>Note that for the race-specific analyses, 2.5% reductions in obesity by 2015 and 2020, and a return to obesity levels from the 1970s by 2030 (5%) were calculated from baseline obesity prevalence rates according to race/ethnicity.

children, policies focused on development of effective obesity treatment strategies is urgently needed to reach these benchmarks.

Current policies have the opportunity to play an important role in childhood obesity reduction. For example, the Healthy, Hunger-Free Kids Act of 2010 (S.3307) (5), represents a critical piece of legislation for reducing childhood obesity. Some of the major changes include reauthorization of the National School Lunch program and an increase in the number of low-income children eligible for free/reduced-price school meals. Policies put forth in these bills are largely public health-focused, possibly having greater impacts on obesity prevention (6) and may be less effective for already obese children, especially given recent research reporting the need for comprehensive behavioral and lifestyle interventions for successfully reducing BMI among obese pediatric populations (4).

Given the larger burden of obesity among minority children, there is a crucial need for development of culturally relevant and aggressive treatment strategies for this population. There is a paucity of studies evaluating the effectiveness of obesity interventions targeting minority children, although research is slowly growing (8). Furthermore, financing for obesity treatment will be critical, as lack of coverage for obesity-related services is a key barrier for intervening in childhood obesity (9,10). There is a significant variability in coverage for obesity prevention- and treatment-related services for children by third-party payers (11). Medicaid’s Early and Periodic Screening Diagnostic and Treatment benefit specifically covers nutritional assessment and health interventions to “ameliorate” physical and mental conditions in children; however, only 10 states cover obesity-related nutritional and behavioral therapy under this benefit (12).

Given that the Healthy, Hunger-Free Kids Act does not specifically address third-party reimbursement for childhood

obesity treatment, other recent legislation will be critical. The Health Care Reform Bill passed in 2010 has a provision focused on increasing Medicaid reimbursement for primary care services, which is critical given that Medicaid covers a disproportionate number of disadvantaged minority children (13). Furthermore, this act, which promotes new initiatives and funding for prevention of chronic disease, may also be critical for addressing treatment, because it will require new health plans to cover obesity screening and counseling for children, and provides funds for development of demonstration projects to create model programs for reducing childhood obesity.

We acknowledge limitations of our study. Our calculations did not take into account future changes in the population distribution by age, cohort, or race/ethnicity. However, according to census projections, we likely underestimated the obesity prevalence that prevention efforts would need to achieve for the overall population, given that Hispanic children, who are disproportionately obese, will represent a higher proportion of children in the overall US population by 2030 (14). We also recognize the dynamic nature of obesity (15), and the notion that “preventive” policies may have spill-over “treatment” effects, reducing weight among overweight/obese children.

Our basic calculations were meant to serve as a heuristic example of the treatment and prevention efforts that will be necessary to reduce childhood obesity. We realize that individuals in both “old” and “new” cohorts will share social environments such as the family, school, and neighborhood, and that the large disparities in obesity prevalence between “old” and “new” birth cohorts (i.e., 10.9% for treatment and 0.3% for prevention in 2030) that would be needed to reach benchmark goals (under low levels of treatment effectiveness) would be impractical. However, the profound requirements necessary to

meet these goals even using these basic models underscores how challenging it will be to reduce childhood obesity to reach benchmark goals if aggressive treatment and prevention strategies for obesity reduction are not pursued in tandem.

### CONCLUSION

In summary, the White House Task Force released a set of ambitious goals for “bending the childhood obesity curve” in a generation. Both prevention and treatment strategies must be pursued to successfully meet these goals, particularly for our most vulnerable pediatric populations. Recent health care legislation in this country may provide us with a unique opportunity to reverse the epidemic of childhood obesity in the United States.

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### DISCLOSURE

The authors declared no conflict of interest.

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