



City of Berkeley  
Department of Health Services  
Public Health Division

**Prevalence of Obesity, Underweight, and Anemia in  
the Child Health and Disability Prevention Program  
(CHDP), Berkeley, 2008-2009**

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## **PREVALENCE OF OBESITY, UNDERWEIGHT, AND ANEMIA IN THE CHILD HEALTH AND DISABILITY PREVENTION PROGRAM (CHDP), BERKELEY, 2008-2009**

### **SUMMARY**

Obesity is a national critical child health problem. Childhood obesity has been linked with adult obesity. Adult obesity is associated with an increased risk for a wide range of chronic illnesses, such as heart disease, diabetes and some cancers.

Since 2005, the Public Health Division has analyzed data collected from local physicians who examined low-income Berkeley children. In fiscal year (FY) 2008/9, the percentage of obese children 0 to 20 years was 17.7%. This represents a large overall reduction since 2005, when the percentage was 24.2%. The overall decrease from 2005 to FY2008/9 was primarily attributable to a reduction in obesity among 0-4 year olds. However, the total obesity rate of FY 2008/9 showed no further reduction compared to FY 2007/8. The overall rate of obesity in Berkeley remains in the same range as the rates of Alameda County or California. However, it should be noted that neither Alameda County nor California showed a significant decrease in childhood obesity since 2005. The percentage of underweight children (7.7%) or those with anemia (4.8%) did not show a changing trend since 2005. 0-4 year old children in Berkeley have a higher underweight rate than their counterparts in Alameda County and California.

Despite a decline over the past four years, the obesity prevalence in Berkeley is still unacceptably high, and we recommend that the City of Berkeley Public Health Division and our community partners take the following actions:

- Encourage and support greater participation among students in breakfast programs at their schools and increase enrollment for the healthy free- and reduced- lunch program.
- Facilitate policy development related to the overall food environment, for example menu labeling requirements for Berkeley restaurants.
- Increase support and follow-up on registering eligible individuals for Electronic Benefit Transfer, EBT (to access farmers' markets, retailers that accept food stamps) and/or Women, Infants, Children (WIC) programs and benefits.
- Provide mini-grants for community residents or community-based organizations that provide innovative solutions and programs that encourage healthy eating and physical activity for youth.
- Explore joint use agreements for school sites and recreation sites for evening and weekend for use by physical activity programs for children and families.
- Offer nutrition education and cooking classes for parents to encourage healthy eating.
- Build partnerships with City of Berkeley Parks and Recreation, Planning Division, and Law Enforcement to create more safe, accessible green spaces for children to play and exercise.



## INTRODUCTION

The Child Health and Disability Prevention Program (CHDP) provides health care and periodic preventive health assessments to California children in low-income families. Eligible children include all Medi-Cal recipients through age 20 and other low-income eligible children up to 19 years of age. As part of routine assessments, physicians monitor childhood physical development and indicators of anemia. To receive reimbursement for services physicians submit encounter forms (PM 160s) that record the child's age, sex, weight, height or length, hemoglobin, and hematocrit. These administrative data are part of a state and national surveillance system for monitoring childhood obesity and anemia.<sup>1</sup>

Copies of PM 160s are provided to local health departments and are compiled by the California Department of Health Care Services (formerly Department of Health Services), which key-enters data and provides extracts to the Centers for Disease Control, as part of the national Pediatric Nutrition Surveillance System (PedNSS). Physicians indicate on the PM 160 form the county health jurisdiction in which the patient resides. A previous assessment of PM 160s submitted in 2005, indicated that over 90% of Berkeley providers use the code for Alameda County (01) rather than Berkeley's code (59).<sup>2</sup> (See discussion for more detail.) Consequently, an overwhelming majority of encounters are subsumed into the Alameda County total, and leaving Berkeley with few observations in official statistics (e.g. 104 children in 2005).

This study was undertaken to accurately estimate the prevalence of obesity and anemia in Berkeley's CHDP population using methods comparable to those used since 2005, and to examine changes in the prevalence of obesity and anemia since 2005.

## MATERIALS AND METHODS

### Data Source

The data source was PM 160 encounter forms for services rendered between July 1, 2008 and June 30, 2009 (measurement year, FY2008/9) and received by the Berkeley Public Health Division by December 31, 2009. The PM 160 reporting was thought to be complete due to the allowance of a greater than 4 month claims lag.

### Sample

Insufficient resources did not allow over 1700 PM 160 encounter forms to be abstracted and logged for the entire measurement year. After discussion with the CHPD staff, it was determined to take a three months sample, which reflected typical seasonal volume variation (September 2008, January 2009, May 2009). These months fell within the measurement period (7/1/2008-6/30/2009) and were based on a fiscal year, similar to the two previous studies. The use of the fiscal year was chosen in order to synchronize Berkeley's performance measurements with the requirements of the State of California.<sup>3</sup>

The minimum sample size of 190 was estimated based on an expected frequency of obesity of 16.7% (Alameda County average), and a margin of error of  $\pm 5\%$  with 95% confidence in a population of 1700 children.



## Data Collection

Patient name, age, sex, ethnicity (American Indian, Asian, Black, Filipino, Hispanic, White, Other, Pacific Islander), county of residence code, weight and height/length, hemoglobin levels, and hematocrit were abstracted from each PM 160 form into an Excel spreadsheet. For patients with multiple visits or for duplicate entries, only most recent unique and complete entry was used. The Excel spreadsheet was imported into an SPSS program (provided by the Centers for Disease Control), which calculated the percentile score for weight of each child based on BMI-for-age in children 25 months to 19 years, and weight-for-length in children 24 months or younger.<sup>1,4</sup> Height/length measurements were assumed to be recumbent at ages 24 months and younger. Children at the 95% or greater weight distribution were classified as obese. Age-, sex-, cut-offs for low/normal hemoglobin were programmed using CDC guidelines.<sup>5</sup>

## Data Quality

Missing data and outliers were assessed using frequency distributions. Due to missing and inaccurate information, BMI could not be calculated for 55 children (12%). Hemoglobin and hematocrit were not recorded for most children (79%). Rather than exclude children with missing hemoglobins or hematocrits from the analysis of anemia, it was assumed that missing data were below thresholds for anemia. While this approach is consistent with previous analyses, the results are not comparable to PedNSS (reported by Alameda County and the State of California), which excludes any missing data from analysis. The resulting anemia prevalence is likely to be an underestimate, however, it provides information to detect changes in temporal trends.

Physicians classified the race of the majority of children as "Other". Because concerns with validity of this information, analyses of outcomes stratified by race/ethnicity were not performed.

## Statistical Analysis

Frequency distributions of prevalence of anemia and obesity were calculated in age strata of 0-4 years of age and 5 to 20 years of age. These strata are used in published data at the state and county level to facilitate comparisons. 95% confidence intervals were calculated using the exact binomial distribution. Time trends were assessed with a chi square for linear trend. P values < 0.05 were considered statistically significant.

## RESULTS

There were 445 unique children in the sample, 69% of whom were under the age of 5 years (Table 1). Males comprised 54%. Few children (3%) had providers who used the correct jurisdiction code to identify the child as a Berkeley resident.

The overall prevalence of obesity was 17.7% in Berkeley (Table 2, Figure 1-4), 14% in 0-4 year olds and 26.3% in 5-20 year olds ( $p < 0.005$ ). At 0-4 years of age (Figure 5), males tended to have higher obesity rates than females ( $p = 0.06$ ). For 5-20 year olds, male and female obesity rates were similar (Figure 6). Berkeley's obesity prevalence rates were not significantly different from those of California and Alameda County. This was true for both age strata

The prevalence of underweight was 7.7% in Berkeley (Table 3), with higher rates in 0-4 year olds (9.6%) compared to 5-20 year olds (3.4%). This difference was statistically significant



( $p=0.04$ ). In 0-4 year olds, Berkeley had a higher prevalence of underweight than Alameda County ( $p=0.05$ ) and California ( $p=0.005$ ).

The overall prevalence of anemia was 4.8%, which was equally distributed among males and females (Table 4).

### Time Trends 2005 to 2009

There was a statistically significant decline in the prevalence of obesity in Berkeley from 2005 to FY2008/9 (Table 5). The main decrease occurred from 2005 to FY 2007/8, and the obesity rate from FY2007/8 to FY2008/9 was unchanged ( $p=0.21$ ). A large reduction in obesity rates in 0-4 years olds appears to have driven the overall decline between 2005 and FY2008/9 ( $p=0.009$ ). In turn, the decline in the 0-4 year olds' obesity rate was most pronounced in females compared to males ( $p=0.003$ ). There was no change in obesity rates among the 5-20 year olds, neither among males nor females.

The prevalence of underweight remained on the same level from 2005 to FY2008/9. There was also no difference if both age groups were examined separately.

Anemia prevalence did not significantly differ over the course of 2005 to FY2008/9.

### DISCUSSION

From 2005 to 2009, there has been a significant overall decrease in the prevalence of obesity among Berkeley CHDP participants. However, from FY2007/8 to FY2008/9 obesity rates showed no further reduction. The overall decrease is mainly attributable to a reduction of obesity rates among the 0-4 year olds, and within this group mostly females experienced the strongest decrease. For the 5-20 year olds, we did not observe changes in the obesity rate over the past 4 years. Berkeley CHDP children have a prevalence of obesity on par with their counterparts in Alameda County and the State of California. The decreasing trend over the past 4 years observed in Berkeley children was not seen in CHDP participants in Alameda County or California, whose prevalence rates have not changed between 2005 and FY2008/9. In contrast to obesity, no significant changes were observed in the prevalence of underweight or anemia in Berkeley CHDP children.

We do not know with certainty the reason for the decreasing trend in obesity prevalence in Berkeley's CHDP children, or why the trend may have slowed in FY2008/9. Changes in Berkeley's population, activities of the Public Health Division's CHDP program and its partners, and other factors may contribute to the explanation.

Between 1990 and 2000, the percentage of low- and middle-income families has decreased in Berkeley, and African American families have borne a disproportionately large share of this decrease.<sup>6</sup> Likewise, there has been a small, steady decrease in the number of children in our annual 3-month samples. Although the eligibility requirements for CHDP have not changed, it is possible, albeit speculative, that the CHDP-eligible population that remains resident in Berkeley may have a lower prevalence of risk factors or higher prevalence of assets (e.g., education) that impact childhood obesity. We do not know whether decreasing Medi-Cal reimbursement rates are impacting physicians' willingness to take new patients. A decline in the size of the population in our samples is consistent with this trend. Our analysis of CHDP data from 2005 to 2008/9 coincide with a strong economic recession that has increased the number of uninsured



and strained the capacity of local community clinics and public health resources. We do not know to what extent our findings are influenced by economic pressures experienced by families that may alter health risks, including individual risk factors (e.g., tobacco, alcohol, risky behaviors) and social determinants of health (transportation, housing, education, etc.).

There is a small group of stable Berkeley pediatric and family practices that provide the bulk of care to CHDP children. Changes in access to care are not likely to explain changing obesity rates. However, in the last decade providers have begun to monitor physical development using age- and sex-specific growth charts incorporating body mass index (BMI) rather than height and weight, which tended to underdiagnose overweight and obesity in children.<sup>4</sup> Over this transition period, the Public Health Division CHDP program has routinely provided educational support for providers, often in collaboration with Medi-Cal managed care plans. An initial prevalence in 2005 that was higher than county-average may reflect an improved diagnosis in Berkeley providers. The decline may reflect increased counseling or referrals that may have indeed reduced obesity rates. It seems less likely that diagnostic sensitivity has changed because it is presumed that Berkeley providers continue to use BMI-specific growth charts. We do not have information on educational outreach to providers in non-Berkeley Alameda County that may shed light on changes in their diagnostic practices or referral patterns.

### **Data Quality**

Berkeley physicians have continued to use the Alameda County code (01) rather than the unique Berkeley code (59) to indicate the local health jurisdiction. Because Berkeley's Medi-Cal programs are administered by a county (Alameda County Social Services) rather than a local agency, several key administrative processes, including the identifiers on patient's Medi-Cal identification cards, do not capture Berkeley's status as a local health jurisdiction. The use of the proper code for jurisdiction would obviate the need for this special survey. Pre-printing downloadable forms from the State website with the Berkeley code, or key entry of (Berkeley) city of residence by the State's commercial processor of PM160s has been suggested, but ruled out as technically or economically infeasible by State agencies.

The prevalence of race/ethnicity could not be taken into account due to the large amount of missing data. It is not known whether this reflects difficulties classifying a potentially significant proportion of individuals with multiracial backgrounds, physician unease with divulging race/ethnicity as a patient privacy issue, or other issues. Since the measurements of hemoglobin or hematocrit were missing for the majority of the children, these measurements could not be analyzed. A substantial proportion of the missing data probably was due to pending laboratory tests that were ordered on the day of encounter. Using paper encounter forms, there was no mechanism to provide the results of these tests. Nonetheless, it must be continually emphasized the importance for providers to collect complete data, so the data can be compared to the County and State benchmarks.

Despite the limitations of missing data, the administrative data of the CHDP program is a valuable resource in monitoring the prevalence of childhood obesity, which is a growing public health concern.<sup>7</sup> This data has also provided the opportunity to observe whether City of Berkeley obesity programs are having an impact in the community.

### **CONCLUSIONS AND RECOMMENDATIONS**





Obesity is a critical child health problem in Berkeley. Childhood obesity is associated with adult obesity, which in turn is associated with an increased risk for a wide range of chronic illnesses, including heart disease and some cancers. Public health interventions to prevent obesity are a high priority. Current Public Health Division programs to address this issue include:

- **Eat Well Berkeley** is a community health program, sponsored by the Kaiser Permanente Healthy Eating Active Living Program. This program is designed to work with restaurants to provide healthy options for their customers, and to support and promote restaurants that provide healthy food choices. For restaurants that offer a kid's menu, one of the criteria for program participation is offering fruit or vegetables but neither French fries nor soda.
- **Corner Store Market Program** is an extension of our Eat Well Berkeley program that works with corner stores near our 3 middle schools and our continuation high school to offer healthier snack and beverage choices for students.
- **Be Fit Berkeley** is a community-wide campaign encouraging Berkeley citizens to eat healthy foods and exercise regularly. Anyone who lives or works in Berkeley can participate in the campaign by registering with the Public Health Division and tracking pounds lost or minutes exercised, and be eligible for raffle prizes.
- **Nutrition Education and Food Access Projects** – Through presentations, taste-testings, and various community outreach events, nutrition education aims to increase fruit and vegetable consumption and physical activity among low-income children and families. We work in collaboration with Head Start, Project BUILD, the Berkeley Unified School District, and various community organizations like Farm Fresh Choice, Berkeley Youth Alternatives, and Youth Spirit Artworks to improve access to affordable, healthy food and increase community awareness and participation in the local food system.

We recommend that the City of Berkeley and our community partners:

- Encourage and support greater participation among students in breakfast programs at their schools and increase enrollment for the healthy free- and reduced- lunch program.
- Facilitate policy development related to the overall food environment, for example menu labeling requirements for Berkeley restaurants.
- Increase support and follow-up on registering eligible individuals for Electronic Benefit Transfer, EBT (to access farmers' markets, retailers that accept food stamps) and/or Women, Infants, Children (WIC) programs and benefits.
- Provide mini-grants for community residents or community-based organizations that provide innovative solutions and programs that encourage healthy eating and physical activity for youth.
- Explore joint use agreements for school sites and recreation sites for evening and weekend for use by physical activity programs for children and families.
- Offer nutrition education and cooking classes for parents to encourage healthy eating.
- Build partnerships with City of Berkeley Parks and Recreation, Planning Division, and Law Enforcement to create more safe, accessible green spaces for children to play and exercise.
- Disseminate this report to City Departments and community partners, including the BUSD and community-based organizations.



## ACKNOWLEDGMENTS

Public Health Division staff members Diane Covall, CHDP Coordinator; Kate Clayton and Tanya Moore, Health Promotion Section; Zandra Lee, Community Health Assessment and Action Section; and Janet Berreman, Health Officer, assisted with the review and editing of this report.

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**Table 1.** Description of CHDP Population, 7/1/08-6/30/09\*

Item	N	Percent
Total	445	100
Age (Years)		
0 – 4	308	69
5 – 20	136	31
Missing	1	
Sex		
Male	239	54
Female	205	46
Missing	1	
Ethnicity		
Asian	29	7
African American	48	12
Latino	61	15
White	5	1
Other	251	63
Pacific Islander	3	1
Missing	48	
County Code		
Alameda County (01)	406	94
Berkeley (59)	12	3
Others (7, 38,41)	13	3
Missing	14	

\* Sample months Sept. 2008, Jan. 2009, May 2009

Note: Missing data excluded from percentages

**Table 2.** Prevalence of Obesity (>95th Percentile)<sup>†</sup>, CHDP, Berkeley, 7/1/08-6/30/09\*

Item	Ages 0-4 (N=272)		Ages 5-20 (N=118)		Total (N=390)	
	N	Percent	N	Percent	N	Percent
Berkeley Total	38	14.0	31	26.3	69	17.7
95% CI		10.1 – 18.7		18.6 – 35.2		14.0 – 21.8
Sex						
Male	25	17.7	16	23.5	41	19.6
Female	13	9.9	15	30.0	28	15.5
Alameda Co., 2008	3,977	12.8	3,642	21.9	7,619	16.0
California, 2008	153,386	15.5	107,492	22.8	260,878	21.2

<sup>†</sup> Based on BMI (> 2 years of age) and weight for length (0 < 2 years)

\* Sample months Sept. 2008, Jan. 2009, May 2009;

CI, Confidence Interval



**Table 3.** Prevalence of Underweight<sup>†</sup> (< 5th Percentile), CHDP, Berkeley, 7/1/08-6/30/09\*

Item	Ages 0-4 (N=272)		Ages 5-20 (N=118)		Total (N=390)	
	N	Percent	N	Percent	N	Percent
Berkeley Total	26	9.6	4	3.4	30	7.7
95% CI		6.3 – 13.7		0.9 – 8.5		5.2 – 10.8
Sex						
Male	15	10.6	4	5.9	19	9.1
Female	11	8.4	0	0	11	6.1
Alameda Co., 2008	2,051	6.6 <sup>a</sup>	399	2.9	44,835	5.5
California, 2008	55,417	5.6 <sup>a</sup>	11,315	2.4	1,461,047	4.6

\* Sample months Sept. 2008, Jan. 2009, May 2009

<sup>†</sup> Based on BMI (> 2 years of age) and weight for length (0 < 2 years)

<sup>a</sup> Berkeley percentage significantly different than the State of California and Alameda County ( $p < 0.05$ ); CI, Confidence Interval

**Table 4.** Prevalence of Anemia, CHDP, Berkeley, 7/1/08-6/30/09\*

Item	Ages 0-4 (N=272)		Ages 5-19 (N=118)		Total (N=390)	
	N	Percent	N	Percent	N	Percent
Berkeley Total	10	3.7	9	7.6	19	4.8
95% CI		1.8 – 6.7		3.5 – 14.0		3.0 – 7.5
Sex						
Male	5	3.1	5	6.4	10	4.2
Female	5	3.4	4	6.9	9	4.4

\* Sample months Sept. 2008, Jan. 2009, May 2009



**Table 5.** Prevalence of Obesity, Underweight, and Anemia, CHDP, Berkeley, 2005, FY2006/7, FY2007/8, FY2008/9\*

Item	2005			2006-2007			2007-2008			2008-2009		
	N	%	CI <sub>95%</sub>	N	%	CI <sub>95%</sub>	N	%	CI <sub>95%</sub>	N	%	CI <sub>95%</sub>
<b>Obese</b>												
Total	107	24.2	20.0 – 28.4	58	17.7	13.8 – 22.3	53	14.3	10.9 – 18.3	69	17.7	14.0 – 21.8
0-4	59	21.0	15.6 – 25.8	34	14.0	9.9 – 19.0	25	9.9	6.5 – 14.3	38	14.0	10.1 – 18.7
Male	29	21.3	14.8 – 29.2	19	13.1	8.1 – 19.7	14	10.9	6.1 – 17.7	25	17.7	11.8 – 25.1
Female	30	20.7	14.4 – 28.2	15	15.3	8.8 – 23.9	11	8.9	4.5 – 15.3	13	9.9	5.4 – 16.4
5-19	48	29.8	22.9 – 37.5	24	28.6	19.2 – 39.5	28	23.7	16.4 – 32.4	31	26.3	18.6 – 35.2
Male	32	33.0	23.8 – 43.3	15	36.6	22.1 – 53.1	14	24.6	14.1 – 37.8	16	23.5	14.1 – 35.4
Female	25	25.0	27.1 – 52.1	9	20.9	10.0 – 36.4	14	23.0	13.1 – 35.5	15	30.0	17.9 – 44.6
<b>Underweight</b>												
Total	20	4.5	2.8 – 6.9	29	9.1	6.3 – 12.8	26	7.0	4.6 – 10.1	30	7.7	5.2 – 10.8
0-4	18	6.4	3.8 – 9.9	26	10.7	7.1 – 15.3	22	8.7	5.6 – 12.9	26	9.6	6.3 – 13.7
5-19	2	1.2	0.2 – 4.4	3	4.8	1.3 – 11.7	4	3.4	0.9 – 8.5	4	3.4	0.9 – 8.5
<b>Anemia</b>												
Total	33	6.7	4.7 – 9.3	23	6.0	3.8 – 8.9	19	4.7	2.8 – 7.2	19	4.8	3.0 – 7.5
0-4	18	5.7	3.3 – 8.8	13	4.6	2.5 – 7.8	11	4.0	2.0 – 12.0	10	3.7	1.8 – 6.7
5-19	15	8.7	4.9 – 13.9	10	9.7	4.8 – 17.1	8	6.1	2.7 – 11.7	9	7.6	3.5 – 14.0

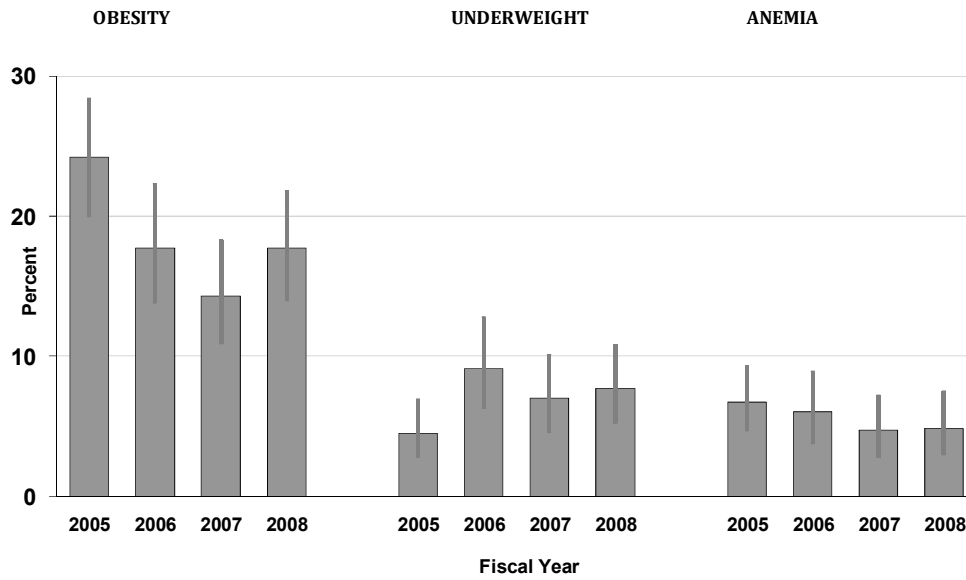
\* Sample months 2005: April, Aug., Dec.

Sample months 2006-7, 2007-8, 2008-9: Sept., Jan., May

CI, Confidence Interval

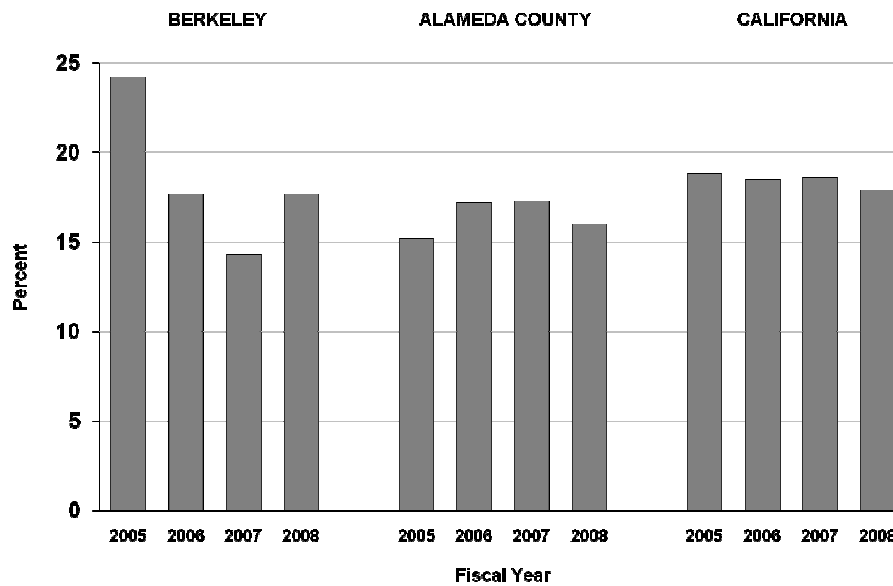


**Figure 1. Prevalence of Obesity, Underweight, and Anemia, CHDP, Berkeley, 2005, 2006-7, 2007-8, 2008-9**



Source: PM 160 encounter forms for services rendered between January 1, 2005 and June 30, 2009

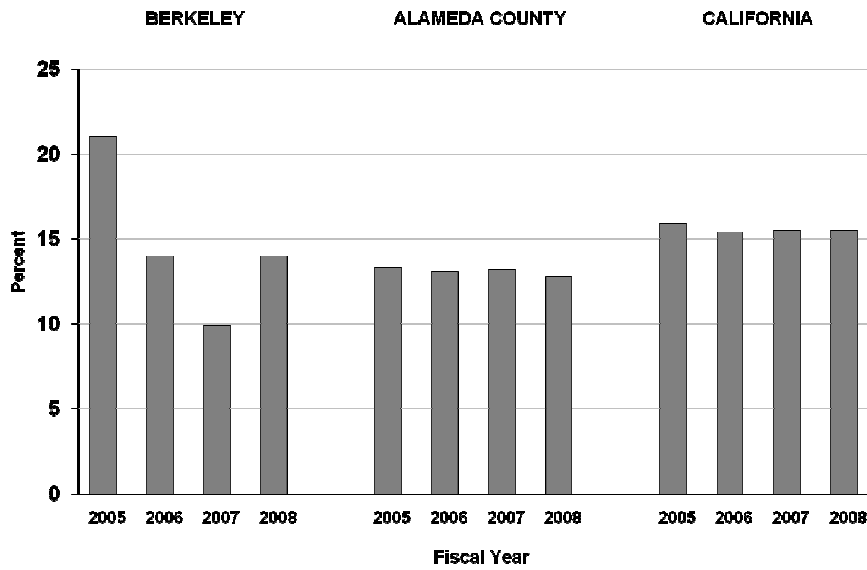
**Figure 2. Prevalence of Obesity in CHDP Children for Berkeley, Alameda County, and California, 2005-9**



Source: California Department of Health Care Services, 2006, 2007, 2008, 2009 and PM 160 encounter forms

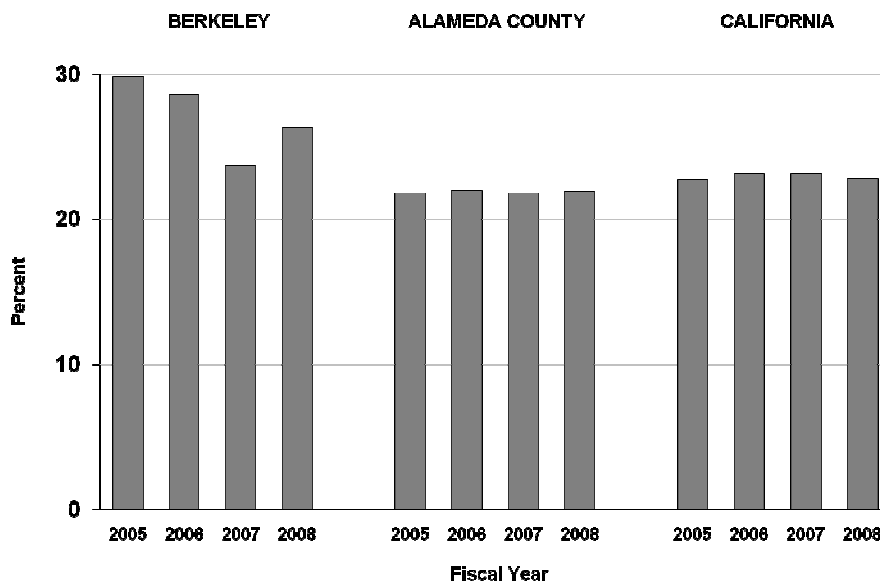


**Figure 3. Prevalence of Obesity in 0-4 Year Old CHPD Children, Berkeley, Alameda County, and California, 2005, 2006-7, 2007-8, 2008-9**



Source: California Department of Health Care Services, 2006, 2007, 2008, 2009 and PM 160 encounter forms

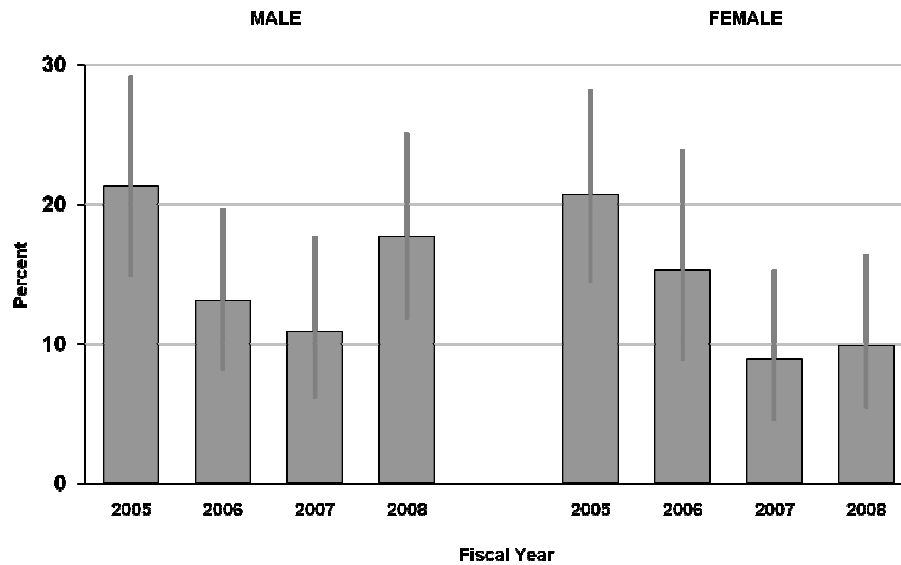
**Figure 4. Prevalence of Obesity in 5-20 Year Old CHDP Children of Berkeley, Alameda County, and California, 2005, 2006-7, 2007-8, 2008-9**



Source: California Department of Health Care Services, 2006, 2007, 2008, 2009 and PM 160 encounter forms

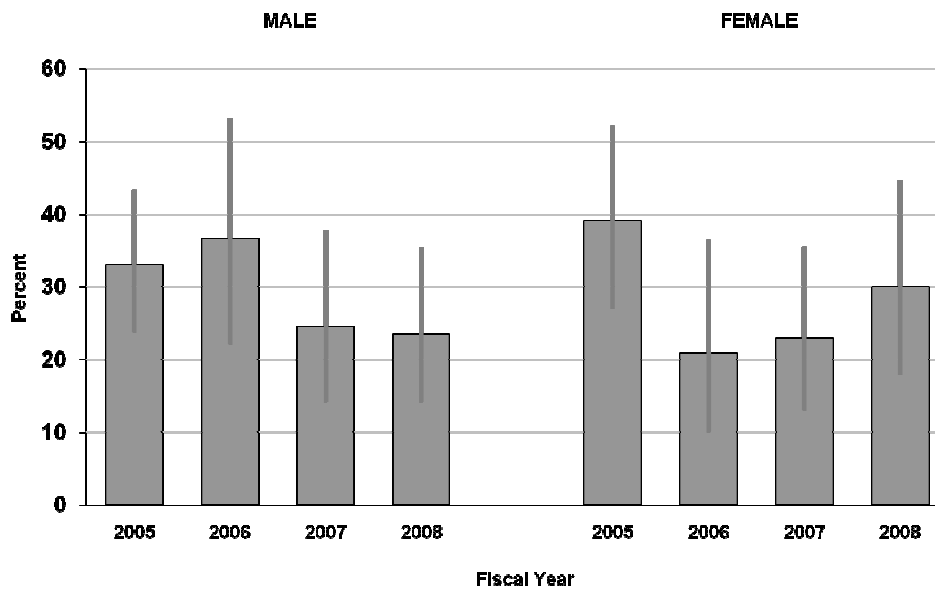


**Figure 5. Prevalence of Obesity in 0-4 Year Old CHDP Children, Berkeley, 2005, 2006-7, 2007-8, 2008-9**



Source: PM 160 encounter forms for services rendered between January 1, 2005 and June 30, 2009

**Figure 6. Prevalence of Obesity in 5-20 Year Old CHDP Children, Berkeley, 2005, 2006-7, 2007-8, 2008-9**



Source: PM 160 encounter forms for services rendered between January 1, 2005 and June 30, 2009

Note: Differences within years and gender are not statistical significant

