

Statewide Weight Status Survey of Sixth Graders in New Jersey during the 2003-2004 School year.

A Joint Project of the New Jersey Department of Education
and the New Jersey Department of Health and Senior Services.

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Abstract

This retrospective records survey was developed to provide baseline (2003-2004 school year) New Jersey specific estimates of the weight status of sixth graders for guiding state health policy, planning, and evaluation in order to address the current epidemic of overweight and obesity. Data on height, weight, demographic information, asthma, diabetes, and participation in regular physical education classes were gathered from school health records of three sixth grade classes in 40 schools yielding a total of 2,393 records. Ten schools were sampled at random from each of four strata consisting of grouped levels of District Factor Groups, a socioeconomic classification of school districts developed by the Department of Education. Body mass index (BMI) was computed from height and weight measurements, and then converted to four categories of underweight, normal, overweight, and obese. The design effect, taking into account the DFG and sampling by school, was approximately 2.3. Statewide, 18% of sixth graders, with 95% confidence interval [16%, 20%], were found to be overweight, and 20% [17%, 23%] obese. For girls, the estimates of overweight and obese were 17% and 17.5% respectively, and for boys 19% and 22.5%. The estimated percent of sixth graders with asthma was 5.2% [3%, 7%]. Type 1 diabetes was noted on only 6 records. Only 19 records indicated an exemption from regular physical education classes. This is the first statewide, non-self-reported study of height and weight in New Jersey.

Citation

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I. Background

Obesity in childhood is a growing global concern and New Jersey is not exempt. In the United States, in the last thirty years, the percentage of overweight youth has doubled for ages 6-11 and tripled for ages 12-19. According to the National Health and Nutrition Examination Survey (NHANES), 15 percent of children aged 6-11, and 12-19, are obese. Obesity places young people at risk for life-long health problems including high cholesterol, high blood pressure, early heart disease, stroke, asthma, depression and diabetes. It is a serious health threat that poses an equally significant economic burden on society. Additionally, a young person's health is associated with his/her academic performance. Since childhood patterns of nutrition and physical activity are key factors in obesity prevention, early intervention is important.

In June 2002, the New Jersey Childhood Obesity Roundtable was convened by the Department of Health and Senior Services (DHSS) to determine the extent of the youth obesity problem in the state. Roundtable participants learned that public school nurses regularly collect student height and weight data; however, this information has not been accessible for evaluation at the state level.

Following the Roundtable, a team from the DHSS and New Jersey Department of Education (DOE) developed a retrospective records survey to establish a baseline estimate of weight status of school age children in order to guide state policy, program planning and evaluation. This study analyzed 2,393 sixth grade records from 40 randomly selected public schools from varying socio-economic strata.

II. Introduction

The survey was designed to determine baseline estimates of the percents of sixth graders who are overweight and obese (severely overweight), and therefore at risk for chronic diseases such as diabetes, hypertension, and high cholesterol. The principal measure of weight status is the body mass index (BMI). The BMI status of sixth graders in this study was evaluated in relation to demographic factors of gender, ethnicity, racial group, and district socioeconomic levels. Presence or absence of asthma and/or diabetes, and student participation in physical education classes were also investigated.

In this report, the weight status is discussed in the following four terms: underweight, normal, overweight, and obese. "Normal" weight status is determined by a BMI between the 5th and 85th percentile of the 2000 CDC BMI for age charts. "Overweight" status is defined as a BMI between the 85th and 95th percentile of the same charts, and "Obese" status refers to a BMI of over the 95th percentile. "Underweight" status refers to a BMI under the 5th percentile. (See also the discussion of "Obese and Overweight" in II. Design of the Survey.)

Secondary purposes of the survey included the evaluation of methods for efficient sampling of school health records, and for determining completeness of those records.

This is the first statewide sample survey of non-self-reported height and weight of children below the age of 14 in New Jersey, and the first statewide survey of school health records for this purpose.

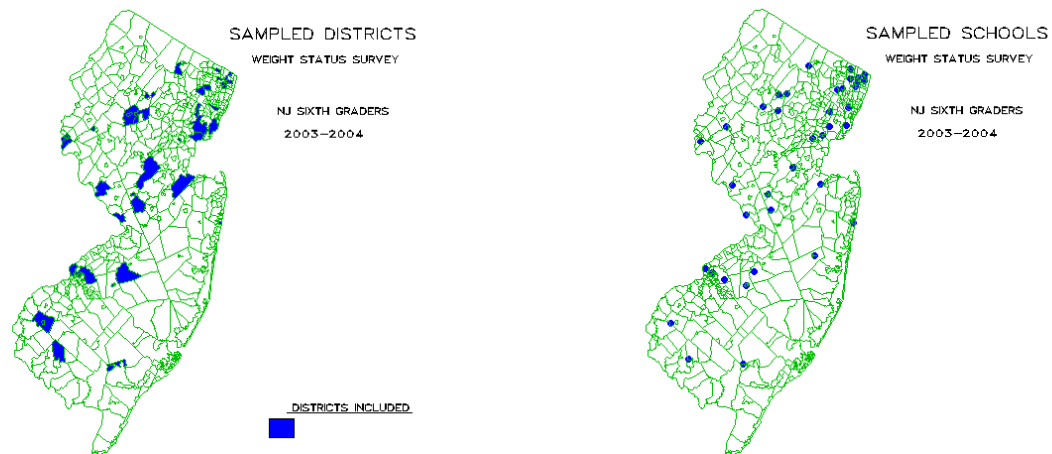
III. Design of the Survey

This survey was conducted in response to the recommendations of the New Jersey Obesity Roundtable convened by the Department of Health and Senior Services (DHSS) at Rutgers University on June 27, 2002. A joint committee of Department of Education (DOE) and DHSS staff designed this statewide sample of sixth grade school health records for the 2003-2004 school year. A pre-test was conducted to evaluate the data collection methods and to estimate the time and effort necessary to access school records.

The sampling design was a stratified, cluster sample, with four District Factor Group (DFG) levels as strata and schools as clusters. The eight DFGs, formulated and utilized by the Department of Education (third edition based on the 1990 CENSUS) were grouped into four levels to ensure balanced coverage of district level socioeconomic strata. The enrollment files from the Department of Education Fall School Survey were obtained for the random selection of 10 schools within each of four DFG levels. (Thus the Fall School Survey served as the frame for selection of schools.) Forty of the 855 elementary and middle schools in New Jersey having sixth grades were selected for the survey (see below and Figure 1).

<i>SES strata (DFG)</i>	<i>Schools sampled</i>	<i>Total schools</i>	<i>Sixth Grade students</i>
Low (AB)	10	304	29,159
Middle low (CDDE)	10	235	24,117
Middle high (FGGH)	10	193	26,654
High (IJ)	10	123	20,857

Figure 1



Confidentiality: This project was conducted with a threefold level of confidentiality: Student names were not recorded, schools were not identified, and only aggregate data were reported. In respect to this retrospective sample, no confidentiality problems arose.

Obese or Overweight: Obesity is a disease condition, and the medical community is recommending in-depth medical follow-up of children with BMI over the 95th percentile. An expert panel (Himes

and Dietz, 2004) also recommended that children with BMI > 85th percentile but below the 95th percentile be considered "at risk of overweight" (referred to in this report as "overweight"), and should be referred to a second-level screen. The second-level screen includes family history, blood pressure, total cholesterol, large prior increment in BMI, and concern about weight. If youths are positive for any of the items on the second-level screen they should be referred for further medical assessment." Thus a detailed follow-up was recommended even for children of overweight status.

Extreme values: School nurses were contacted to double check four records with very high weights and early dates of birth. One transposition of weight and height was corrected. There are children in sixth grade, of normal age for the grade, who weigh more than 200 pounds. In the case of children who appeared to be too old for the grade, school nurses confirmed that their schools had several children in sixth grade who were 14 or even 15 years old. These were not excluded.

Students with disabilities: The statistical weights for schools within strata were computed on the basis of the number of students sampled and the total enrollment. A very small number of students with disabilities, although counted in the total enrollment, may be in separate classes or even separate school facilities, and hence not part of this sample frame. The numbers of these students are far too few to affect the weights and/or the estimates. Whether a student was disabled was not asked on the data collection form (Appendix 3).

District Factor Groups (DFG): The AB District Factor Group contains the A and B groups of school districts as determined by a factor analysis of socioeconomic data by the Department of Education. The A group is much more different in socioeconomic status from the B group than the AB group is from the CDDE group. Hence a better reduction in variance than the present stratification might be obtained in future studies by making the A group, the lowest socioeconomic level (SES), into a separate stratum. Also, some type of regression of results upon the DFG component values may be of interest. The present survey design was carried out with a view to simplicity and maximum balance between strata.

The Department of Education has released the DFGs derived from the 2000 CENSUS. If stratification by DFG is done in future surveys, the 2000 DFG should be utilized. An extensive discussion is presented on the website www.state.nj.us/njded/finance/sf/dfg.shtml.

IV. Conduct of the Survey

On February 13, 2004, district superintendents, school principals and school nurses were mailed a packet consisting of a letter from the Commissioner of Education, background information on the obesity epidemic, three data collection forms with instructions (see Appendix 3) including a time frame for return of data, and a procedure for selecting three classes within the school. The school nurses gathered data from the school health records, sometimes augmented by data from administrative records, during February and March. In several schools, height and weight measurements were carried out specifically for this study since they had not been collected previously in the school year.

Follow-up telephone calls were made to confirm that the study packets had reached the principals and school nurses. At least two schools had computerized data systems which shortened the data

gathering effort. The completed data sheets, usually three in number, were returned by mail, postage paid, to Family Health Services in the Department of Health and Senior Services.

V. Statistical Methods

Returned datasheets were checked for completeness and for correct interpretation of the data items. Data were entered into computer files on a personal computer and tabulated. When these tabulations revealed data grossly out of range, telephone calls were made to double check records. Initially 2,403 records were received. Ten records from one school were set aside when the height and weight, as well as gender, could not be retrieved by the school nurse. After several corrections minus these ten records, the data for analysis consisted of 2,393 records.

The initial estimates of percentages were made by conventional method of weighting the records by the inverse of the probability of selection. Weighting is necessary to compensate for sampling within schools, and for selecting a fixed number of schools within district socioeconomic strata. The weights reflect both the number of schools within strata and the total number of students within each school. (Schools were not sampled according to size.) Calculations for this analysis were carried out using the EPI-INFO (Version 6), CSAMPLE program, and confirmed with the IVEware software from the Institute of Social Research at the University of Michigan. Several charts were prepared with the R-language and Microsoft Excel. The statewide estimates are percentages adjusted for the strata based on District Factor Groups and for school effects (clusters).

Person performing measurements

In the sample, the vast majority of measurements were carried out by nurses, (Table 1). Height and weight values were the result of actual measurements and were not self-reported.

The school health records revealed a spread of dates on which the heights and dates were measured (see Table 2). Weight status (underweight, normal, overweight, or obese) was evaluated by gender and age at which the measurements were taken. The measurements made in March and April of 2004 may have been made specifically in response to this study; however, the question of why the measurements were made at that time was not asked specifically on the data form.

Table 1 Percent of health record height and weight measurements, according to the profession of measurer, in the records sampled.

Person making Measurement	Sample (N=2393)
Nurse	89.3%
Doctor	5.9%
PE teacher	4.0%
Other	0.7%

Table 2 Numbers of sampled students by month that height and weight were measured.

Month measured	Students
Prior to Sept, 2003	102
Sept 2003	365
Oct 2003	615
Nov 2003	213
Dec 2003	146
Jan 2004	154
Feb 2004	197
Mar 2004	506
Apr 2004	75

Note: Weight status was evaluated by age specific BMI limits.

VI. Results of the Survey

Statewide Estimates of Weight Status

Table 3 sets forth the confidence limits and point estimates for the weight status categories (see definitions in I. Introduction), as well as by gender and Hispanic ethnicity.

Table 4 presents the estimates of obesity among sixth graders by socioeconomic status of their school districts. Socioeconomic status was indicated by the DFG developed by the DOE. The estimated percent obese in the low socioeconomic status districts (27%) was more than two and a half times the obese percentage in the high socioeconomic status districts (10%). The increase in percent overweight and obese with lower levels of socioeconomic status is a statistically significant effect statewide, and not due to sampling variation.

In Figure 3, the gender difference appears to diminish at the lowest SES status. The 95% confidence limits on these eight percentages are approximately ► 7 %.

In Figure 4, a stacked bar chart, the Obese and Overweight categories have been combined into one category labeled "Over". The effect of gender is clearly visible, as is the increasing total percentage of overweight sixth graders with decreasing economic status. (The District Factor Group level IJ is the highest socioeconomic group.)

Table 3 Statewide estimates of sixth grade weight status in New Jersey, 2003-2004.

Category	Statistical Estimates and 95% confidence limits		
% Obese	19.8	16.9	22.5
% Overweight	18.2	16.5	19.8
% Normal	60.0	57.0	63.2
% Underweight	2.0	1.3	2.7
% Obese, boys	22.5	19.2	25.8
% Obese, girls	16.9	13.1	20.6
% Overweight, boys	18.8	17.1	20.6
% Overweight, girls	17.5	14.9	20.1
% Normal, boys	56.7	52.6	60.9
% Normal, girls	63.5	60.6	66.4
% Underweight, boys	1.9	0.8	3.0
% underweight, girls	2.1	1.2	3.0
% Obese, Hispanic	28.7	20.6	36.7
% Obese, Non-Hisp.	17.8	15.9	19.8
% Overweight, Hisp.	19.2	13.3	25.1
% Overweight, Non-Hisp.	17.9	16.0	19.9
% Normal, Hisp.	50.1	45.4	54.7
% Normal, Non-Hisp.	62.2	59.4	65.0
% Underweight, Hisp.	2.0	0.7	3.4
% Underweight, Non-Hisp.	2.0	1.2	2.8

Table 4 Estimated percent obese by District Factor Groups, Sixth Grade, 2003-2004.

District Socioeconomic status	Statistical Estimates and 95% confidence limits		
Low (AB)	27.5	22.0	33.0
Middle low (CDDE)	20.3	17.0	23.5
Middle High (FGGH)	18.0	15.0	21.0
High (IJ)	10.1	7.5	12.7

Figure 2

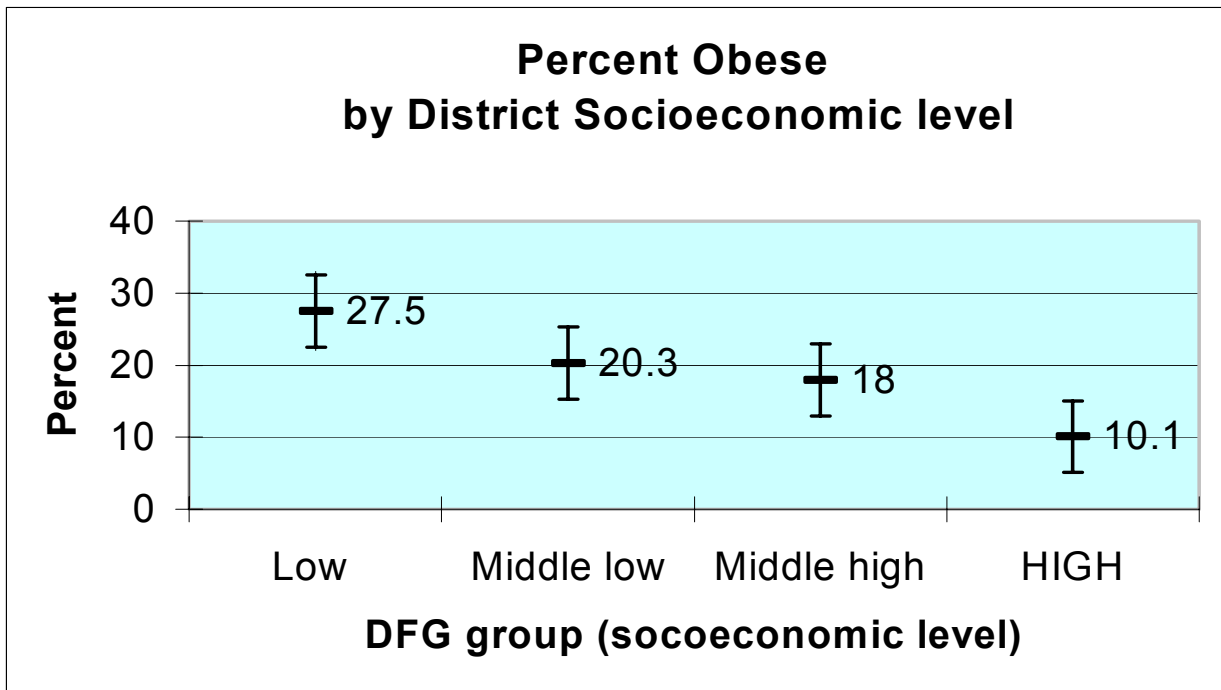


Figure 3

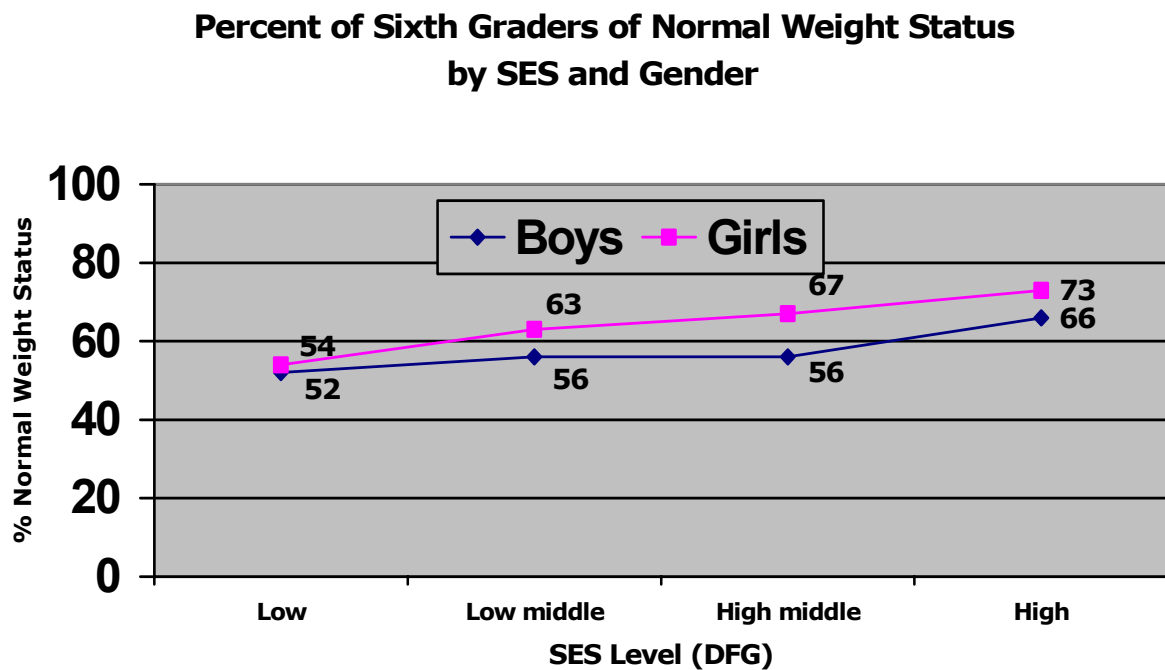
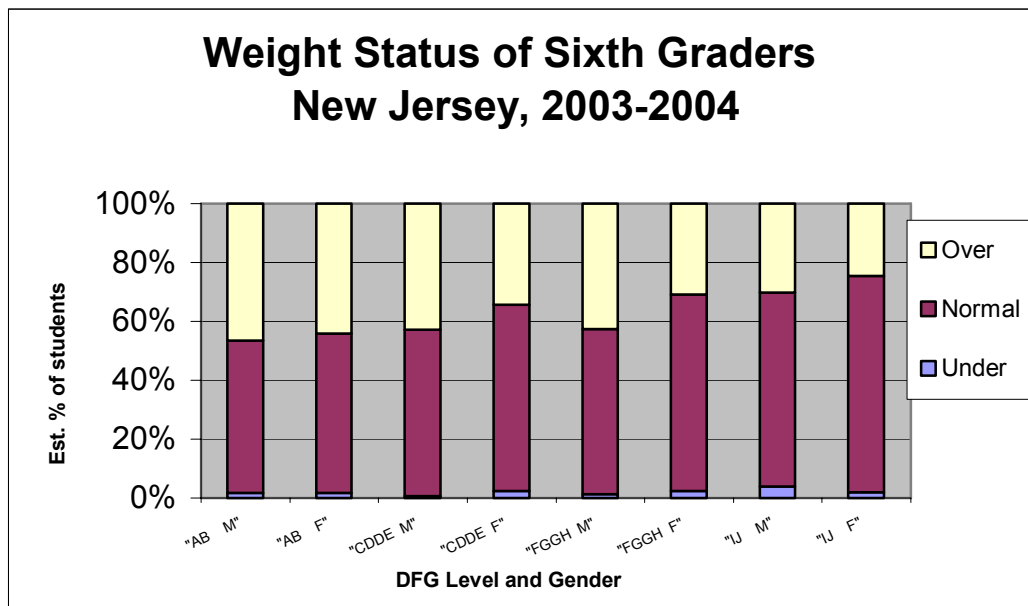


Figure 4



Asthma

In the complete sample, 159 records noted the presence of asthma. The sample estimates and the statewide estimates of asthma prevalence are set forth in Table 5 below.

The overall risk of having asthma when of abnormal weight status (Underweight, Overweight, Obese) was 1.6 [1.2, 2.1] times the risk of having asthma when of normal weight, i.e. 60% greater risk than when of normal weight. This elevation of risk for those of abnormal weight status was statistically significant. The estimated percentage of asthma when of abnormal weight (Underweight, Overweight, Obese) was 6.7% [3.7%,9.7%].

Asthma Action Plan

The New Jersey Administration Code calls for an asthma action plan to be present in school health records when a child has asthma. The estimated percent of children with asthma who also have asthma action plans is 49% (95% confidence limits 33-65%). The sample percent was 47% (75 with plan / 159 with asthma).

Table 5 Statewide estimates of percent of sixth graders with asthma as noted on school health records.

<i>Asthma</i>	<i>Weighted Estimates and 95% Confidence Limits</i>		
	<i>%</i>	<i>%</i>	<i>%</i>
Statewide percent	5.2	3.1	7.2
Male	5.8	3.1	8.6
Female	4.5	2.8	6.2
Hispanic	5.1	1.5	8.8
Non-Hispanic	5.2	3.2	7.1
White	5.3	3.2	7.3
Black	7.3	2.7	11.8
Other	3.0	0.6	5.4
DFG level (SES)			
AB "low"	4.3	1.0	7.6
CDDE "middle low"	8.5	2.6	14.3
FGGH "middle high"	4.3	0.7	7.8
IJ "high"	4.8	1.5	8.1
BMI status			
Obese	6.0	2.8	9.3
Overweight	7.2	3.7	10.6
Normal	4.2	2.5	5.8
Underweight	8.3	1.0	15.7

Note: DFG level indicates the socioeconomic status of the school district.

Diabetes

Only six records of the 2,393 records sampled had diabetes noted. All six were Type 1 diabetes. Since these were only a very small portion of the sample (0.3 %), confidence limits were computed using the binomial distribution, unadjusted for the sampling method. The percent of records with Type 1 diabetes noted was 0.3%, [0.1% to 0.6%]. (Statistical 95% confidence limits are shown in brackets).

Although the sample contained no records with Type 2 diabetes, the exact binomial statistical confidence limits for the percent of sixth graders having Type 2 diabetes are not zero, but rather 0.00% to 0.15%.

Exemption from regular physical education classes

As with diabetes, very few (19/2393) children of the sample were noted to be exempt from regular PE classes. By binomial distribution estimation, unadjusted for sampling design, the estimated percent exemptions with 95% statistical confidence limits is 0.8% [0.5% to 1.3%].

VII. Discussion

Conduct of the survey: One district could not participate, and a replacement school was contacted. Of 40 school nurses contacted, only one failed to make a complete effort to collect the data, turning in data from only seven students. Another school was contacted to replace this data. In one district, sixth graders from all elementary schools were combined into a middle school in September. In this school, the nurse referred us to the middle school nurse and principal, both of whom agreed to participate and submitted data.

Mailings were addressed to principals and school nurses by name. It was necessary to verify that they received the study documents and that they agreed to participate. Time for telephone checking and re-sending documents might have been reduced by use of overnight delivery or other services, but this would have entailed additional addressing and mailing costs. Only three schools required follow-up telephone calls to clarify minor points of data recording or gathering.

Sample size and design effect: The anticipated sample size was $2,640 = 40$ schools times 3 classes times 22 students per class (approximate state average). The actual number of records for analysis was 2,393. Also, the design effect in sampling schools (clusters) was over 2, a bit larger than anticipated. That is, this survey required over twice the number of records that a completely random selection would have required to achieve the same precision. The precision obtained in this survey resulted in a confidence interval of plus or minus 3% on the percentage of sixth graders of obese weight status.

Recognition of racial categories separate from Hispanic ethnicity: Two school nurses requested assistance in coding this information. In about one third of the records with Hispanic ethnicity marked as Yes, race was marked as O (other).

Measurement units, height and weight: All schools reported height and weight data in English units (inches and pounds) rather than metric units (cm, kg). Many schools (90%) reported height to the half-inch or better, and 50% of the schools recorded weight to the nearest half pound. For one child, a physician gave metric measurements.

Date recording: Reporting of dates of birth was complete. Some (10%) dates of measurement were missing the day, although month and year were given. These were set to mid-month for analysis purposes.

However, 4% (90) of records were missing the date of measurement. These were replaced by the nearest previous date of measurement in the records for that school. Alternatives might have been to scatter the dates at random throughout the month, or to use four or five imputations to compute the effect on the variance of the BMI. At age 12, a one positive month difference in age has very little effect, approximately equivalent to a 0.06 increase in BMI as indicated by the BMI for age charts.

Measurement dates and sources: Dates and personnel performing the measurements varied across the 2003-04 school year and among schools because this data was gathered from school health records, rather than from a pre-arranged measurement schedule.

How this survey can be improved: This survey was, with the exception of two schools where measurements were made for the survey, a study of pre-existing data on school records. As such, the dates of measurements, staff performing the measurements, local standards for weighing, ethnicity, and racial grouping varied with schools. The variation might be improved by conducting training for school nurses selected for this study, including a review of procedures for correctly performing anthropometric measurements and the importance of scale calibration.

The design effect of sampling by schools, rather than completely at random schools, exceeded 2. The survey design minimized the number of schools and the number of records sampled in order to reduce interference with the daily routine of the schools, and also to be able to process the survey with minimal resources currently available at the Department of Health and Senior Services and the Department of Education. If more precise answers to other questions are required in the future, then the sample size in terms of the number of schools, records with schools, and sampling procedure will be reconsidered. Sampling with probability proportional to the number of sixth graders within a school was not done, and might be considered for future surveys.

The diabetes data (none, type 1, type 2, type unspecified) collection found only 6 (0.3%) records with type 1 in 2393 records. The response of "Exempt from regular physical education (Y/N)" was uninformative, the answer being different from N in only 19 (0.8%) of the sampled child records. However, these data items could be helpful for sampling higher grades. However, more might be learned from better choices of data items to characterize associated disease conditions and physical education performance. The New Jersey Statute requires 150 minutes per week of physical education, health, and safety. Absenteeism might be such a data item for future surveys.

Comparison with National Health and Nutrition Survey (NHANES) 1999-2000: Table 6. is a comparison of this 2003-2004 New Jersey data for sixth graders (11-13 year olds) with estimates

published by the CDC (Table 71 revised 1/14/2003) for 12-19 year olds which were obtained from physical examinations. In all categories except "Black, non-Hispanic girls", New Jersey has numerically higher statewide estimates of obesity than these national rates.

However, just as mortality and morbidity tables are age-adjusted for comparing states and other populations, weight status rates should be adjusted for Hispanic Origin and Race for valid comparison among states. New Jersey has substantial Hispanic and African American populations; other states may not. The extent of the obesity problem in a state is indicated by the unadjusted rates, but such rates are not pure indicators of the underlying conditions. The size of susceptible populations may influence rates independently from underlying conditions. Hence, comparative statements such as "New Jersey is worse than ..." should distinguish between "worse" meaning a worse problem, or meaning worse underlying, non-demographic, conditions in the state.

Table 6 Estimates of percent child obesity from NHANES 1999-2000 and New Jersey 2003-2004.

Age, Sex, Race And Hispanic Origin	NHANES 1999-2000	New Jersey 2003-2004
	12-19 years of age	11-13 years of age
	Percent of population (standard error)	
Both sexes	15.5 (1.2)	19.8 (1.4)
Boys	15.5 (1.6)	22.5 (1.7)
White, non-Hispanic	12.8 (2.4)	18.9 (2.4)
Black, non-Hispanic	20.7 (2.6)	24.8 (4.3)
Mexican or Hispanic	27.5 (3.0)	32.5 (2.8)
Girls	15.5 (1.6)	16.9 (1.9)
White, non-Hispanic	12.4 (2.1)	14.6 (1.4)
Black, non-Hispanic	26.6 (2.7)	22.2 (2.5)
Mexican or Hispanic	19.4 (2.8)	24.7 (6.3)

VIII. References

- (1997). Revisions to the Standards for the Classification of Federal Data on Race and Ethnicity. Office of Management and Budget. Federal Register, October 30, 1997.
- (2000). Body mass index-for-age percentiles: Girls 2 to 20 years, Boys 2 to 20 years. CDC: National Center for Health Statistics and National Center for Chronic Disease Prevention and Health Promotion.
- An, Anthony B. (2004). Performing Logistic Regression on Survey Data with the New SURVEYLOGISTIC Procedure. SAS Institute Inc., Cary, North Carolina.
- Cole TJ, Bellizzi MC, Flegal KM, Dietz WH (2000). Establishing a standard definition for child overweight and obesity worldwide: international survey. British Medical Journal, 6 May 2000, Vol. 320, pp 1-6.
- Crane, Giles (2003). Survey Design S-35: Statewide Height and Weight Survey of Sixth Graders in New Jersey, 2003-2004. New Jersey Department of Health and Senior Services/Family Health Services/Child and Adolescent Health Program.
- Crane, Giles (2003). Memo Report: Preliminary Estimates from Pre-Test of Ht/Wt Survey. New Jersey Department of Health and Senior Services, Family Health Services, Child and Adolescent Health Program.
- Goodenow, Carol (2002). The 1999 Massachusetts Youth Behavioral Risk Assessment: Appendix A, Sampling Survey Administration, Data Weighting, and Data Analysis Procedures. Massachusetts Department of Education HIV/AIDS Program with funding and technical assistance provided by the CDC Division of Adolescent and School Health.
- Haas JS, Lee LB, Kaplan CP, Sonneborn D, Phillips KA, and Liang S-Y (2003). The Association of Race, Socioeconomic Status, and Health Insurance status with the Prevalence of Overweight Among Children and Adolescents. Am. J. of Public Health, Vol. 93, No. 12, pp 2105-2110.
- Hart, Raymond (2004). Time to resolve our issues and be positive. *Trenton Times*. April 18, 2004, Editorial page.
- Himes JH and Dietz WH (2004). Guidelines for overweight in adolescent preventive services: recommendations from an expert committee. The Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. American Journal of Clinical Nutrition, Vol 59, 307-316.
- Mille, Karin (2002). Bulletin: New Jersey Childhood Obesity Roundtable, June 27, 2004. New Jersey Department of Health and Senior Services, Family Health Services, Child and Adolescent Health Program.

- Mille, Karin (2002). Bulletin: "Who Cares? Why Care? So What? Childhood Obesity - A serious challenge for the 21st Century." New Jersey Department of Health and Senior Services, Family Health Services, Child and Adolescent Program.
- Thorpe, Lorna, and Helgersen, Steven (2003). Protocol: Childhood Height and Weight Survey, New York City, 2003. New York City Dept. of Health/Division of Epidemiology, Bureau of Epidemiological Services.
- Whitaker RC, Wright JA, Pepe MS, Seidel KD, Dietz WH (1997). Predicting Obesity in Young Adulthood from Childhood and Parental Obesity. New England J. of Medicine Sept 25, 1997, Vol 337, No. 13, pp 869-873.
- Yee TW (2002). VGAM Family Functions for Quantile Regression. www.stat.auckland.ac.nz/~yee.

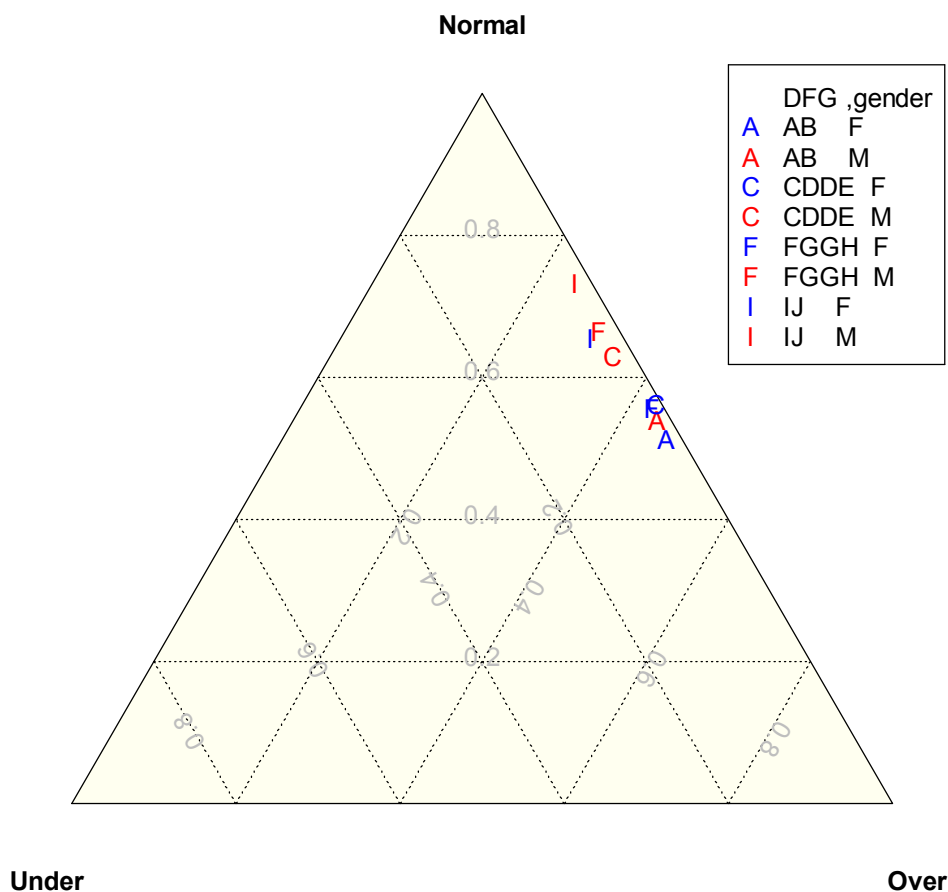
APPENDIX 1 -- Graphical displays of results with Ternary Diagrams for proportions underweight, overweight and normal.

The proportions of sixth graders "at risk for overweight" and "severely overweight" have been combined to a single proportion "overweight". This proportion might be described as the proportion of children who might be given some consideration due to their weight status.

A ternary diagram represents the fractions of three components as distances from each vertex of an equilateral triangle. The ternary diagram has been extensively applied in chemical applications where the ternary "coordinates" are the proportions of three components in a mixture.

In the ternary diagram below, each point represents the proportions in the BMI categories of underweight, overweight, and normal weight status, of male or female (pink) sixth graders (red) in one of the four SES groups (AB, CDDE, FGGH, IJ).

Figure 5.
Weight Status of NJ Sixth Graders, 2003-2004



For example, the red represents the estimated weight status of male sixth graders from the highest SES Districts (2% underweight, 24.5% overweight, and 73.5% normal weight).

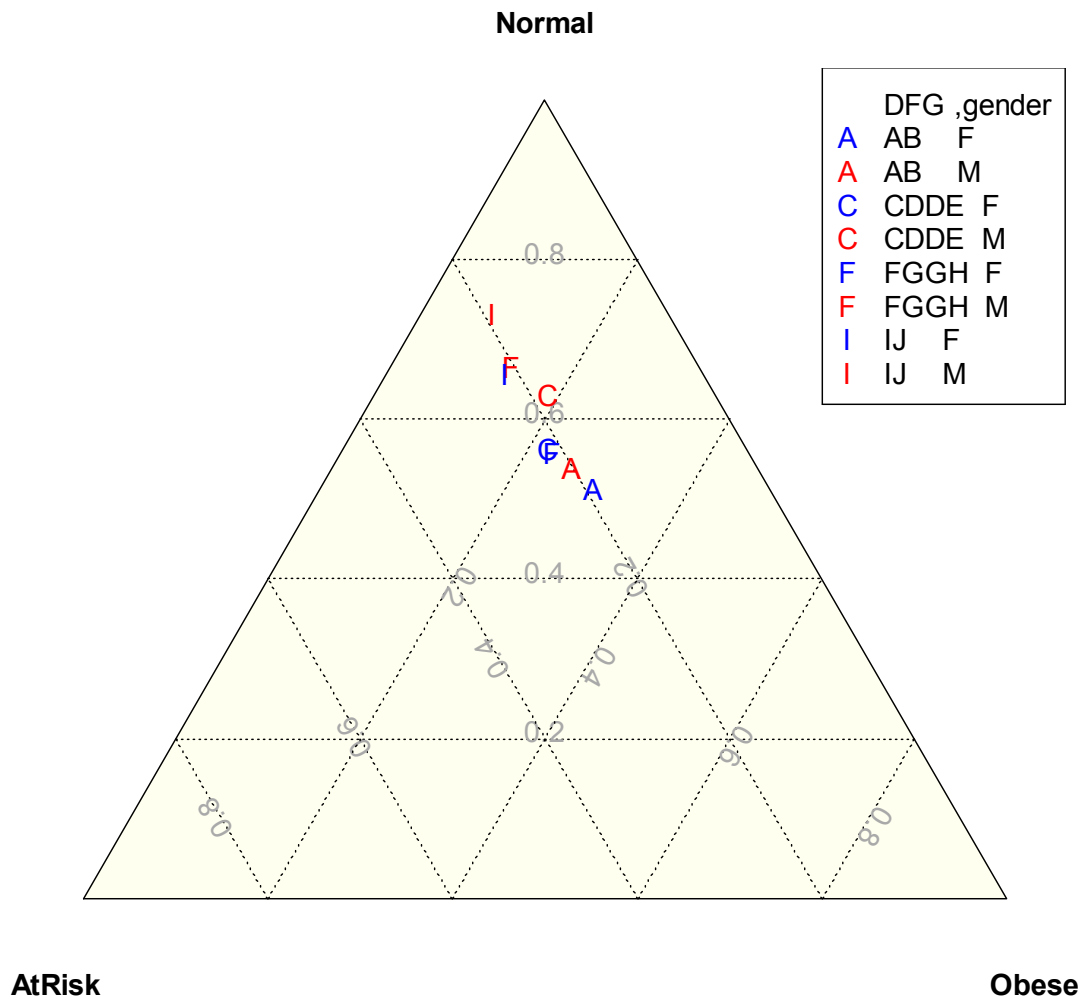
Ideally, all groups with good nutrition and physical exercise should move toward the apex of the triangle ("Normal"). The ternary diagram may be helpful in future in displaying large numbers of BMI status results.

Another way to display these results is by a series of stacked bar charts. District Factor Group levels IJ is the highest socioeconomic group. The effect of gender is clearly visible, as is the increasing percentage overweight with decreasing socioeconomic status.

With the underweight and overweight combined into an "At Risk" category, the following ternary diagram displays the increase in proportion Normal from the lowest SES District Factor Group AB to the highest SES District IJ. As the SES increases, the percent At Risk does not seem to change, and remains at approximate the 20% level no matter which SES-gender group.

It is also clear that the higher SES groups approximate the pre-2000, national average of about 15% obese.

Figure 6
Weight Status of NJ Sixth Graders, 2003-2004



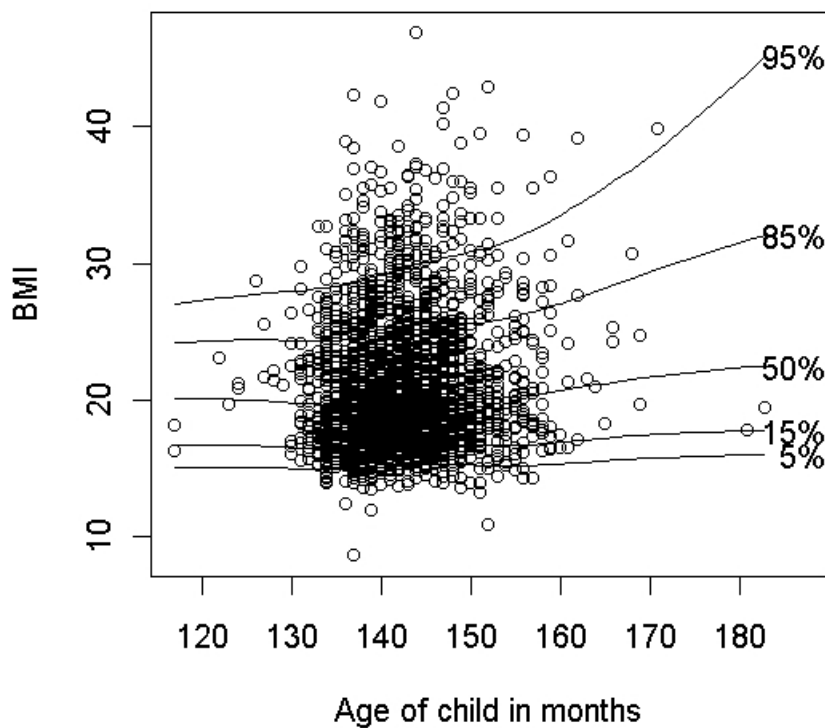
APPENDIX 2 -- Graphical displays of results with quantile plots of sampled BMI versus age.

The fitting of percentile lines to BMI at each age is known as percentile regression. This process applied to thousands of BMI measurements or age ranges 2 to 20 for males and females results in the standard CDC BMI for age charts.

Using the data for the limited age range of this survey, we fit 5,50,85,95 percentile lines using the vector generalized linear models (VGAM) of Yee (Yee, 20002).

Figure 7

Quantile plot of VGAM fit to Sixth Graders

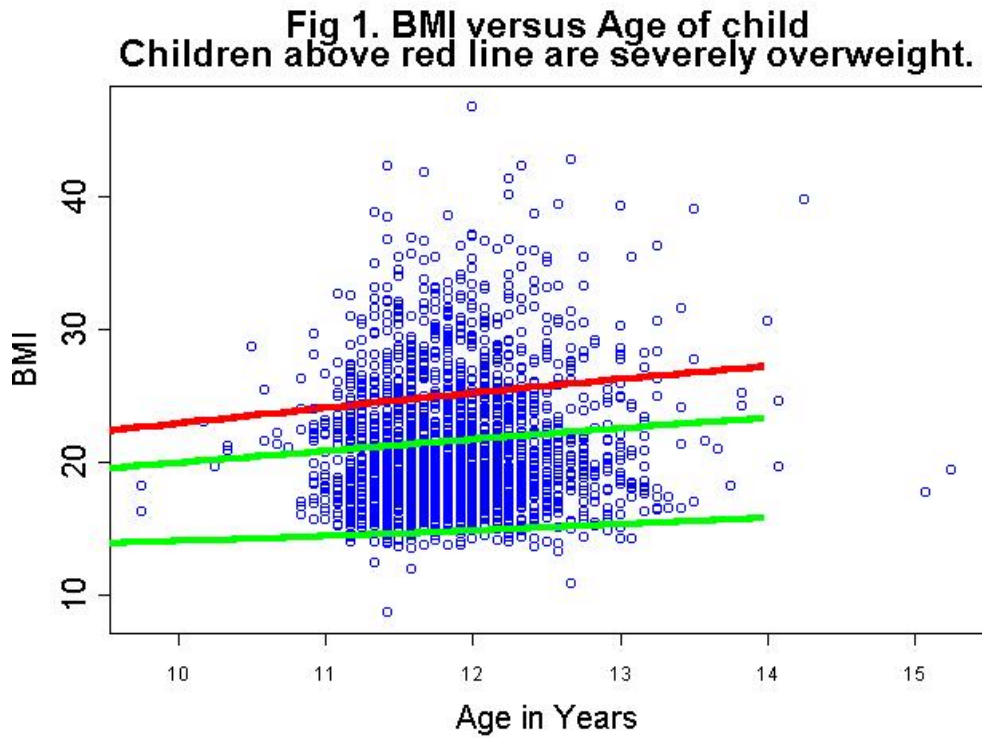


The New Jersey quantile lines in Figure 7 correspond to lines on the standardized CDC charts, but have different values because these percentile lines pertain to the New Jersey sixth grade population. The 85% line on the CDC standard BMI for age charts has been taken to determine the category of overweight because their line approximately intersects BMI of 25 at adulthood. The BMI value of 25 is a widely recognized (WHO, MRC, CDC ...0 standard for classifying adults as overweight.

In Figure 8 below, the CDC standard percentile lines bounding the categories of "normal" weight status (zgreen) are overlaid on our data.

Each small circle represents a student, and the large number of students above the CDC "obese" weight status (red line) illustrate the problem of overweight in New Jersey.

Figure 8



APPENDIX 3 -- Data Collection Form (both sides)

DATA COLLECTION TOOL -- GRADE 6 Child Weight Status Sample

Sheet ____ of ____ sheets

District: _____

Person completing form: _____

Telephone: _____

School: _____

Please return to Karin Mille, MCCH, P.O. Box 364, Trenton, NJ 08625-0364

County: _____

in the supplied envelopes. (Please retain a copy.)

Count	DOB <u>mm/dd/yy</u>	Gender (M, F)	Hispanic /Latino (Y,N)	Race group (W,B,N, A,P,O)	Height ☐ inches ☐ cm.	Weight ☐ pounds ☐ kg.	Date Measured <u>mm/dd/yy</u>	Measured by: (N, D,P,O)	Diabetes: (0,1,2,3)	Asthma (Y,N)	Asthma Action Plan (Y,N)	Exempt From Phys.Ed (Y,N)
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
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16												
17												
18												
19												
20												
21												
22												
23												
24												
25												

INSTRUCTIONS for the Data Collection Tool, Grade 6 Child Weight Status Sample

DOB = Date of Birth

Gender: M=male, F=female

Ethnicity group (CENSUS):

Y= Hispanic origin/Latino

N= Non-Hispanic

Racial group (CENSUS):

W = White

B = Black/African American,

N= Native American (American Indian / Alaskan Native)

A = Asian

P = Pacific Islander / native Hawaiian,

O = Other

Height: inches are preferred, but centimeters can be entered if cm are used in your school. **Please check the inches or cm box.**

Weight: pounds are preferred, but kilograms can be entered if kg are used at your school. **Please check the pounds or kg box.**

Date Measured: date that height and weight were measured. If day is not known, insert 00 for day. If month or approximate month is not known, insert NA for "Not available". Note, if all sixth graders in a homeroom were measured at once, the homeroom teacher may have the date of measurement in her plan book.

Measured by: N = school nurse

D = family doctor

P=Physical Education Teacher

O=Other

(Please write D quite differently than O.)

Diabetes: 0 = none

1 = Type 1 diabetes

2 = Type 2 diabetes

3 = diabetes, unspecified

Asthma: Y = Yes, child has asthma

N = No, child does not have asthma

Asthma Action Plan: Y=Child has Asthma Action Plan.

N=Child does not have an Asthma Action Plan.

Exempt from Phys. Ed.: Y = Child is exempt from physical education classes.

N = Child is not exempt.

EXAMPLE:

Sheet 1 of 2 sheets												
Count	DOB <u>mm/dd/yy</u>	Gender <u>(M, F)</u>	Hispanic /Latino <u>(Y, N)</u>	Race group <u>(W, B, N, A, P, O)</u>	Height <u>X inches</u> <u>□ cm.</u>	Weight <u>X pounds</u> <u>□ kg.</u>	Date Measured <u>Mm/dd/yy</u>	Measured by: <u>(N, D, P, O)</u>	Diabetes: <u>(0, 1, 2, 3)</u>	Asthma <u>(Y, N)</u>	Asthma Action Plan <u>(Y, N)</u>	Exempt from Phys. Ed <u>(Y, N)</u>
1	<u>04/02/92</u>	<u>N</u>	<u>Y</u>	<u>W</u>	<u>62.5</u>	<u>154</u>	<u>10/23/03</u>	<u>N</u>	<u>0</u>	<u>N</u>	<u>N</u>	<u>Y</u>
2	<u>09/22/91</u>	<u>F</u>	<u>N</u>	<u>B</u>	<u>61</u>	<u>143</u>	<u>09/22/03</u>	<u>N</u>	<u>2</u>	<u>Y</u>	<u>Y</u>	<u>Y</u>
3	<u>06/15/01</u>	<u>F</u>	<u>N</u>	<u>W</u>	<u>67.5</u>	<u>158</u>	<u>10/04/03</u>	<u>P</u>	<u>0</u>	<u>N</u>	<u>N</u>	<u>N</u>