Objective: To investigate factors associated with self-reported weight status of economically active adults from the 4 major ethnic groups in South Africa.

Design: Cross-sectional survey.

Setting: South Africa.

Participants: A random sample (N=2100) was selected from a database of economically active adults from the 4 major ethnic groups in South Africa (Black, White, Asian, and mixed ancestry). Of the 2100 selected, 554 subjects returned mailed questionnaires.

Main Outcome Measures: Weight status (BMI), dieting history, meal patterns, intake of high fat food items and alcohol, level of physical activity, smoking habits, family history of obesity, and socioeconomic characteristics.

Results: Identified risk factors for overweight/obesity included: Black ethnicity, education level ≤ Grade 7, inactivity, and at least one overweight parent. Protective factors included: describing one’s own weight as under- or normal weight, hardly ever or never bingeing, not having tried to lose weight during the past year, and describing one’s own health as excellent. Factors that were not related to overweight/obesity in this group included: employment status, income, smoking, meal patterns, intake of high fat food items and alcohol, and “sick” days taken off from work during the prior 6 months. (Ethn Dis. 2003;13:109–116)

Key Words: Overweight, Obesity, Self-Reported Weight Status, BMI, Lifestyle Behaviors, Adults, Ethnic Groups, South Africa, Intervention, Weight Management

INTRODUCTION

Exposure to lifestyle factors such as unhealthy diet, smoking, lack of exercise, and, possibly, stress, contribute to the development of chronic diseases of lifestyle, including coronary heart disease, strokes, type 2 diabetes mellitus, and tobacco- and nutrition-related cancers. Obesity, due, in part, to the aforementioned lifestyle factors, also contributes directly or indirectly to the development of these chronic disease conditions.

In 1995, 48% of reported mortality in South Africa was due to chronic diseases. This is not surprising, given the fact that the burden of chronic disease risk factors is high, as illustrated by the following statistics: Hypertension prevalence rates are 13.9% for Blacks, 13.6% for those of mixed ancestry, 9.6% for Asians, and 14.8% for Whites. Hypercholesterolemia prevalence rates range from 0–12.5% for Blacks (higher among urban Blacks), 17% for those of mixed ancestry, and 25%–26% for Whites. Thirty-four percent of all South Africans smoke, with figures being higher for males than females in all ethnic groups, and highest for the mixed ancestry group. An increasing number of South Africans, urban and rural, find themselves in a phase of nutritional transition which involves changes related to economic, social, demographic (specifically urbanization), and health factors, with the net result being an increased prevalence of obesity and non-communicable diseases of lifestyle.

The high prevalence rates of overweight and obesity among South African populations could also be an important contributing factor to the high prevalence rates of chronic diseases. The most recent Demographic and Health Survey indicated that among women (aged 15–65 years), the prevalence rates of obesity (BMI ≥ 30) were 31.8% in Blacks, 26.3% in those of mixed ancestry, 21.1% in Asians, and 22.7% in Whites. The rates were lower in men, ranging from 6.0% in Blacks to 18.2% in Whites. The prevalence of overweight/obesity (BMI ≥ 25) was also high in children from disadvantaged backgrounds, ranging from 4%–20% in 1–9 year olds.

Prevention of chronic diseases is of prime importance for all South African ethnic groups, which requires addressing unfavorable lifestyle factors and the high prevalence of obesity in each population group. Provisions for the prevention, early detection, and cost-effective management of chronic diseases are generally inadequate in South Africa, particularly when compared with the recommended WHO guidelines. The multicultural backgrounds of patients requiring health care further compound the problems of inadequate diagnosis and poor management of chronic diseases and their risk factors. Therefore, the use of intervention models and materials developed in Western societies, or for use with one particular ethnic group, may not be appropriate for those with different lifestyles, habits, and practices, which indicates a need to develop and test culturally sensitive intervention programs for specific target groups and situations in South Africa.

In order to address these issues, the aims of this study were: 1) to investigate self-reported weight status and associated factors in economically active South Africans from the 4 major ethnic groups; 2) to identify specific factors associated with the development of over-
Factors Associated with Overweight/Obesity - Senekal et al

“The most recent
Demographic and Health
Survey indicated that among
women (aged 15–65 years),
the prevalence rates of obesity
(BMI≥30) were 31.8% in
Blacks, 26.3% in those of
mixed ancestry, 21.1% in
Asians, and 22.7% in
Whites.”

Weight/obesity in these populations; and
3) to formulate conclusions regarding
factors to be considered in the design of
culturally sensitive interventions.

Research Methods

Study Population

The sample was randomly drawn
from the South African National Data-
base, the largest consumer database in
South Africa, and comprised more than
7 million economically active adults
(consumers between the ages of 18 and
65). The sampling frame included
names and addresses of 52% White,
30% mixed ancestry, 11% Asian, and
6% Black South Africans. A random
sample of 2100 was drawn to be propor-
tionally representative of all ethnic
groups in the database, and to include
at least one small town and one city
from each of the 9 provinces in the final
sample.

Data Collection

A questionnaire eliciting lifestyle fac-
tors and self-reported weight status was
mailed to the randomly selected adults.
Each questionnaire was mailed with a
prepaid return envelope. After the due
date for the return of the questionnaires
had passed, a reminder was mailed to
the non-responders. A second reminder
followed the first one. The researchers
checked each returned questionnaire be-
fore data processing commenced.

Development of the Questionnaire

The questionnaire was devised by
experts in nutrition in order to evaluate
the weight status (outcome variable) and
associated factors (exposure variables) in
economically active South Africans. The
dendrogram technique15 was used to de-
velop the questionnaire by means of a
theoretical framework. This technique
provides a focus during the review of
related literature and also sets boundar-
ies within which theory is studied. The
theoretical basis is identified by repeat-
edly asking the subject the question, “Is
determined by what?” In this manner,
concepts and theory are identified and
organized in a structured way. The ex-
posure variables measured by the ques-
tionnaire included questions on socio-
demographic characteristics, dieting his-
tory, meal patterns, frequency of intake
of high fat foods and alcohol, level of
physical activity, smoking habits, cur-
rent health status, and family history of
overweight/obesity.

Weight status was determined from
self-reported weight and height mea-
surements, which were then converted
to the body mass index (BMI; weight
[kg]/height^2 [m]).16 Weight status of
each participant’s parents was requested
in descriptive terms, ie, overweight/normal/thin.

Eating patterns were characterized
by the following descriptive phrases: 3
meals/day with no snacking between
meals; 3 meals/day with eating between
meals; 1–2 meals/day with no snacking
between meals; 1–2 meals/day with eat-
ing between meals; or no regular meals
but small frequent snacking throughout
the day. Dieting behavior was deter-
mained by questions on the subjects’ per-
ception of their own weight, frequency
of dieting, and binging. Intake of high-
fat foods was measured by consumption
frequency of specified portions of high
fat food items that are typically part of
the diets of the various South African
ethnic groups.17 These items included
the following: red meat (high fat cuts),
poultry with skin, fried chicken and
fish, organ meats, processed meats, meat
pies/sausage rolls, fried potatoes/french
fries, deep fat fried confections (vetkoek,
doughnuts, koeksusters), whole milk,
coffee creamers, cheese, chocolates, reg-
ular margarine (soft and hard), butter,
lard, regular salad dressings, mayon-
naise, and crisps.

The determination of physical activity
levels was based on self-reported
physical activity “when not at work,” as
well as on self-reported evaluation of to-
tal levels of physical activity as low,
moderate, or high; descriptions of each
level were included. Participants were
asked to report on their past and present
smoking habits, and health status
was evaluated based on self-evalu-
ation of health as excellent, good, fair,
or poor, as well as the number of “sick”
days taken off from work during the
prior 6 months. General questions on
age, education, and socioeconomic sta-
tus were included.

Validity and Reliability of the Questionnaire

Content validity of the question-
naire was ensured by the following: 1) an
in-depth review of the literature
(with an emphasis on South African re-
search)18,19 to ensure a sound theoretical
basis for the development of the ques-
tionnaire based on the “dendogram”15
technique; and 2) evaluation of the ques-
tionnaire by a senior epidemiologist
from the South African Medical Re-
search Council, as well as by 3 experts
in different fields of health sciences.
Suggested changes were incorporated
into the questionnaire.

The questionnaire was piloted using
20 Black and 16 White male and female
adults.
Data Analyses

Statistical analyses were conducted using the SAS statistical software package. Contingency tables were constructed to analyze differences between the ethnic groups regarding the socio-demographic characteristics, as well as the BMI categories (using the chi-square statistic). To determine the association between weight status (under/normal weight: BMI<25; overweight/obese: BMI≥25) and exposure variables (factors associated with weight status), the chi-square was computed to test for significance, which was then followed by logistic regression to compute the odds ratios (OR) and 95% Wald confidence intervals. The odds ratio is defined as the odds of disease (overweight) in exposed (exposure variable) subjects divided by the odds of disease (overweight) in unexposed subjects. The procedure was repeated while adjusting for age and sex, which are known to be associated with BMI and therefore could act as confounders. All 554 records were included in the analysis of the socio-economic data and initial BMI data. However, the dietary data (frequency of intake of specific food items) was judged to be unreliable in 49 records, which were excluded during the logistic regression analyses.

Ethical Issues

Detailed information concerning the purpose of the research was included in an introductory letter that accompanied the questionnaire. Confidentiality and anonymity were guaranteed. Participation in the study was completely voluntary (no incentives were promised), and the completion and return of the questionnaire indicated informed consent.

RESULTS

A profile of the study population is presented in Table 1. The proportions from the various ethnic groups who participated were: Blacks 27%, Asians 12%, mixed ancestry 18%, and Whites 43%, with each group, except those of mixed ancestry, consisting of a nearly equal number of male and female respondents. More than 50% of the respondents in the Black, mixed ancestry, and Asian groups were between 25 and 45 years old, while the largest percentage in the White group were between 45 and 65 years old. The majority of Black (81.1%) and White (68.8%) participants were employed. These 2 groups also had the largest percentage of participants with a tertiary education. However, 56.8% of Black and 73.7% of mixed ancestry respondents fell into the low income category. Since the response rate was only 28%, we do not attempt to generalize our results. However, based on a paucity of data on risk factors for overweight/obesity in different South African populations, particularly those who are economically active, we believe that these findings contribute to a better understanding of this problem.

A large proportion of participants were overweight and obese, particularly Black women and women of mixed ancestry (Table 2). The mean BMIs of the women in these 2 ethnic groups were also significantly higher than those of the males, while this is not true for the other 2 ethnic groups (Table 3).

Factors associated with self-reported weight status of the study population, when adjusted for age and gender, include the following (Table 4).

Risk factors: Black ethnicity (OR=1.776, P=.0077), education status ≤ grade 7 (OR=1.66, P=.0176), physical activity level when not at work.

Table 1. Socio-demographic profile (%) of the study population (N=554)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Blacks</th>
<th>Mixed Ancestry</th>
<th>Asians</th>
<th>Whites</th>
<th>Chi-square P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
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<td></td>
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</tr>
<tr>
<td>Females</td>
<td>48.7</td>
<td>60.8</td>
<td>49.2</td>
<td>53.3</td>
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<tr>
<td>Males</td>
<td>51.3</td>
<td>39.2</td>
<td>50.8</td>
<td>46.7</td>
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</tr>
<tr>
<td>Age (years)</td>
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<td>&lt;25</td>
<td>8.8</td>
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<td>14.3</td>
<td>7.5</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>25–34</td>
<td>27.0</td>
<td>37.6</td>
<td>22.2</td>
<td>24.6</td>
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<td>35–44</td>
<td>37.2</td>
<td>17.8</td>
<td>34.9</td>
<td>19.2</td>
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</tr>
<tr>
<td>45–54</td>
<td>15.5</td>
<td>11.9</td>
<td>23.8</td>
<td>27.9</td>
<td></td>
</tr>
<tr>
<td>55–65</td>
<td>11.5</td>
<td>16.8</td>
<td>4.8</td>
<td>20.8</td>
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</tr>
<tr>
<td>Highest level of education</td>
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</tr>
<tr>
<td>Primary (grades 1–7)</td>
<td>12.2</td>
<td>21.8</td>
<td>3.2</td>
<td>0</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Secondary (grades 8–10)</td>
<td>15.0</td>
<td>39.6</td>
<td>27.0</td>
<td>12.6</td>
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<tr>
<td>Secondary (grades 11–12)</td>
<td>29.3</td>
<td>25.7</td>
<td>36.5</td>
<td>32.6</td>
<td></td>
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<tr>
<td>Tertiary</td>
<td>43.5</td>
<td>12.9</td>
<td>33.3</td>
<td>54.8</td>
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<tr>
<td>Income (per month)</td>
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<tr>
<td>Low (&lt;R4000)</td>
<td>56.8</td>
<td>73.7</td>
<td>46.6</td>
<td>21.5</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Middle (R4000–7999)</td>
<td>36.0</td>
<td>19.7</td>
<td>34.5</td>
<td>34.7</td>
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</tr>
<tr>
<td>High (R8000+)</td>
<td>7.2</td>
<td>6.6</td>
<td>19.0</td>
<td>43.9</td>
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<tr>
<td>Marital status</td>
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</tr>
<tr>
<td>Single</td>
<td>29.1</td>
<td>33.3</td>
<td>22.2</td>
<td>15.0</td>
<td>.0006</td>
</tr>
<tr>
<td>Married/cohabiting</td>
<td>58.1</td>
<td>55.9</td>
<td>74.6</td>
<td>73.8</td>
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<tr>
<td>Widowed/divorced</td>
<td>12.8</td>
<td>10.8</td>
<td>3.2</td>
<td>11.2</td>
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<tr>
<td>Employment</td>
<td></td>
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<tr>
<td>Student/housewife</td>
<td>7.4</td>
<td>26.7</td>
<td>33.3</td>
<td>21.3</td>
<td>&lt;.0001</td>
</tr>
<tr>
<td>Full time employed</td>
<td>81.1</td>
<td>44.6</td>
<td>57.1</td>
<td>68.8</td>
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<tr>
<td>Unemployed</td>
<td>4.7</td>
<td>20.8</td>
<td>9.5</td>
<td>2.1</td>
<td></td>
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<tr>
<td>Retired</td>
<td>6.8</td>
<td>7.9</td>
<td>0.0</td>
<td>7.5</td>
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</tr>
</tbody>
</table>
Table 2. Column percentages of ethnic group and gender by BMI categories (N=554)

<table>
<thead>
<tr>
<th>BMI Category</th>
<th>Black</th>
<th>Males</th>
<th>Females</th>
<th>MA*</th>
<th>Black</th>
<th>Males</th>
<th>Females</th>
<th>MA*</th>
<th>Asian</th>
<th>Males</th>
<th>Females</th>
<th>MA*</th>
<th>White</th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N=77</td>
<td>N=72</td>
<td></td>
<td>N=40</td>
<td>N=62</td>
<td></td>
<td></td>
<td>N=32</td>
<td>N=31</td>
<td></td>
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<td>N=112</td>
<td>N=128</td>
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<tr>
<td>BMI &lt;20</td>
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<tr>
<td>(underweight)</td>
<td>15.9</td>
<td>3.6</td>
<td>2.9</td>
<td></td>
<td>14.8</td>
<td>19.4</td>
<td>4.5</td>
<td></td>
<td>11.6</td>
<td>9.7</td>
<td>18.5</td>
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<td>16.6</td>
<td>18.2</td>
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<tr>
<td>BMI 20–24.9</td>
<td>34.8</td>
<td>21.8</td>
<td>51.4</td>
<td>19.2</td>
<td>45.2</td>
<td>44.4</td>
<td>39.1</td>
<td>46.2</td>
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<tr>
<td>(normal weight)</td>
<td>29.0</td>
<td>34.6</td>
<td>25.7</td>
<td>21.3</td>
<td>25.8</td>
<td>18.5</td>
<td>41.8</td>
<td>24.0</td>
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<td>BMI 25–29.9</td>
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<tr>
<td>(overweight)</td>
<td>20.3</td>
<td>40.0</td>
<td>20.0</td>
<td>44.7</td>
<td>9.7</td>
<td>18.5</td>
<td>14.6</td>
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<td>BMI ≥30</td>
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<td>(obese)</td>
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</table>

* Chi-square P value for gender in ethnic groups by BMI categories; Males, .0307; Females, .0004.
† MA = mixed ancestry = European/African/Malay origins.

rated as low (OR=1.927, P=.0285), self-rating of physical activity level as low (OR=2.707, P=.0032) or as moderate (OR=1.903, P=.0032), and an overweight father/mother (OR=2.456, P=.0129).

Protective factors: describing one's own weight as under/normal weight (OR=0.019, P=.0001), hardly ever or never binging (OR=0.343, P=.0004), not having tried to lose weight during the past year (OR=0.322, P=.0001), and describing one's own health as excellent (OR=0.373, P=.0227). Being single is a significant protective factor when not adjusted for age and gender, but this relationship disappears when adjusted.

Factors not associated with the weight status of the study group: employment status, income, smoking, meal patterns, intake of high fat food items, alcohol intake, and "sick" days taken off from work in the prior 6 months.

DISCUSSION AND IMPLICATIONS FOR INTERVENTION

The ethnic profile of the economically active South Africans represented in the South African National Database does not reflect the country's general demographic profile, according to which 77.2% South Africans are Black, 8.8% of mixed ancestry, 2.6% Asian, and 10.7% White. The same can be said of the educational and employment status of the respondents in our sample. All the respondents in the sample had at least primary school education, while literacy figures for South Africans for 1991 (newest official figures) were 54% for Blacks, 66% for those of mixed ancestry, 84% for Asians, and 99% for Whites. The 1997 unemployment figures for South Africans for 20:3% for Black males (national average: 7.9%), and 40% for Black females (national average: 34.4%); 20% for males of mixed ancestry (national average: 6.1%), and 44.7% for females of mixed ancestry (national average: 25.9%); 9.7% for Asian males (national average: 3.2%), and 18.5% for Asian females (national average: 21.6%); and 14.7% for White males (national average: 14.6%), and 18.2% for White females (national average: 18%). Our data depicted a sharp rise in the prevalence of obesity among people who seem to be better educated and financially more privileged than the general South African population. This can possibly be explained by the well documented positive association be-

Table 3. Mean ± standard deviation (SD) BMI for males and females in the ethnic groups studied (N=554)

<table>
<thead>
<tr>
<th>Ethnic Group</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
<th>Males</th>
<th>Females</th>
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</thead>
<tbody>
<tr>
<td>Black</td>
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</tr>
<tr>
<td>N=77</td>
<td>25.57 (6.96)</td>
<td>29.76 (6.50)</td>
<td>25.38 (4.17)</td>
<td>29.12 (7.92)</td>
<td>23.80 (4.27)</td>
<td>24.50 (5.45)</td>
<td>26.15 (6.51)</td>
<td>25.82 (6.55)</td>
</tr>
<tr>
<td>P†</td>
<td>.0012</td>
<td>.0129</td>
<td>.5858</td>
<td>.6977</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MA*</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>N=40</td>
<td>25.57 (6.96)</td>
<td>29.76 (6.50)</td>
<td>25.38 (4.17)</td>
<td>29.12 (7.92)</td>
<td>23.80 (4.27)</td>
<td>24.50 (5.45)</td>
<td>26.15 (6.51)</td>
<td>25.82 (6.55)</td>
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<td>P†</td>
<td>.0012</td>
<td>.0129</td>
<td>.5858</td>
<td>.6977</td>
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<tr>
<td>Asian</td>
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<td>N=32</td>
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<td>P†</td>
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<td>White</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N=112</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P†</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* MA = mixed ancestry = European/African/Malay.
† Student t test value difference between mean BMI for males and females.
Table 4. Association (unadjusted and adjusted for age and sex) between weight status (BMI <25=under/normal weight; BMI ≥25=overweight/obese) and exposure variables (N=505)

<table>
<thead>
<tr>
<th>Exposure Variable</th>
<th>Level</th>
<th>N</th>
<th>Unadjusted</th>
<th>Adjusted for Age &amp; Sex</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Odds Ratio</td>
<td>95% Wald Confidence Interval</td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>255</td>
<td>0.877</td>
<td>0.623–1.262</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>250</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>≥35</td>
<td>188</td>
<td>0.443</td>
<td>0.257–0.763*</td>
</tr>
<tr>
<td></td>
<td>36–55</td>
<td>228</td>
<td>0.645</td>
<td>0.379–1.096</td>
</tr>
<tr>
<td></td>
<td>56+</td>
<td>78</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Race</td>
<td>Black</td>
<td>124</td>
<td>1.598</td>
<td>1.026–2.489*</td>
</tr>
<tr>
<td></td>
<td>Mixed ancestry</td>
<td>82</td>
<td>1.402</td>
<td>0.844–2.330</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
<td>58</td>
<td>0.593</td>
<td>0.327–1.074</td>
</tr>
<tr>
<td></td>
<td>White</td>
<td>231</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Marital status</td>
<td>Married/cohabiting</td>
<td>334</td>
<td>0.711</td>
<td>0.387–1.305</td>
</tr>
<tr>
<td></td>
<td>Single</td>
<td>109</td>
<td>0.372</td>
<td>0.187–0.739*</td>
</tr>
<tr>
<td></td>
<td>Widowed/divorced</td>
<td>51</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Education status</td>
<td>≤Grade 7</td>
<td>119</td>
<td>1.832</td>
<td>1.202–2.807*</td>
</tr>
<tr>
<td></td>
<td>Grade 8+</td>
<td>374</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Physical activity</td>
<td>Low</td>
<td>141</td>
<td>1.946</td>
<td>1.137–3.332*</td>
</tr>
<tr>
<td></td>
<td>when not at work</td>
<td>252</td>
<td>1.203</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>89</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td></td>
<td>High</td>
<td>83</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Overweight father/mother</td>
<td>Yes</td>
<td>256</td>
<td>2.152</td>
<td>0.997–4.646*</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>239</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Describe own weight</td>
<td>Underweight</td>
<td>34</td>
<td>0.022</td>
<td>0.006–0.077*</td>
</tr>
<tr>
<td></td>
<td>Normal weight</td>
<td>296</td>
<td>0.156</td>
<td>0.099–0.247*</td>
</tr>
<tr>
<td></td>
<td>Overweight</td>
<td>161</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Binge</td>
<td>Never/hardly</td>
<td>427</td>
<td>0.384</td>
<td>0.218–0.676*</td>
</tr>
<tr>
<td></td>
<td>1–3×/week</td>
<td>66</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Tried to loose weight in past year</td>
<td>Yes</td>
<td>307</td>
<td>0.347</td>
<td>0.236–0.509*</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>184</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>Describe own health</td>
<td>Excellent</td>
<td>84</td>
<td>0.342</td>
<td>0.127–0.198*</td>
</tr>
<tr>
<td></td>
<td>Good</td>
<td>260</td>
<td>0.718</td>
<td>0.288–1.791</td>
</tr>
<tr>
<td></td>
<td>Fair</td>
<td>125</td>
<td>0.783</td>
<td>0.303–2.023</td>
</tr>
<tr>
<td></td>
<td>Poor</td>
<td>21</td>
<td>1.00</td>
<td></td>
</tr>
</tbody>
</table>

* Chi square for general association followed by PROC LOGISTICS (logistic regression, maximum likelihood estimates) to compute odds ratios and confidence intervals and PROC GLM to compute means.

† Significant differences (P<.05) between LS means (only included for adjusted values) are indicated by different letters (a, b, c); where the letters are the same, the means do not differ significantly.

‡ Significant odds ratio.

Between improved socioeconomic status and increased BMI,26–29 further, our respondents were classified as urban dwellers because they resided either in cities or small towns. According to Kalk,30 living in an urban area constitutes a risk for the development of obesity (possibly owing to the effect of nutrition in transition), especially in Black men. This factor could also be partially responsible for the the prevalence of obesity among the Black men in our sample, which was more than twice that of the national average.

Considering the growing global prevalence of obesity, it is perhaps not surprising that many of the factors found to be associated with overweight/obesity in the present study are similar to those found in both developing41 and developed countries.32,33 These include the most commonly reported factors, namely low education,34–36 inactivity,37–39 parental obesity,40,41 and ethnicity.42,43 The latter includes specific groups who are more prone to obesity, such as Black women (American, South African) compared to White women (American, South African, and European).44 The apparent association between maternal/paternal overweight/obesity and overweight/obesity prevalence in this sample population can possibly be...
Our data depicted a sharp rise in the prevalence of obesity among people who seem to be better educated and financially more privileged than the general South African population.

explained using a model developed by Hill et al. According to this model, body weight and composition are determined both by current environmental conditions (eg, lifestyle factors, including dietary composition and level of physical activity), and by the individual’s functional phenotype. The latter represents the behavioral and metabolic characteristics of the individual as determined by the interaction of genetics and past environmental experiences (including lifestyle factors). Some data suggest that lifestyle characteristics of offspring, such as physical activity, dietary preference, and macronutrient intake, are modelled on attributes found in the household of origin. Therefore, social learning may play an important role in the eventual expression of the functional phenotype, and should be considered in any intervention program aimed at addressing obesity and diseases associated with lifestyle practices.

Perhaps less well documented are the effects of dieting, binge-eating episodes, and self-evaluation of weight status as overweight, all of which were associated with overweight/obesity in the present study. The fact that an individual’s not having dieted for the prior 6 months is significantly protective against the development of overweight/obesity in economically active South Africans suggests that the worldwide trend of dieting without long-term success may also be prominent in our study group. Weight cycling, which is often the result of unsuccessful dieting, also has the potential to contribute to the development of chronic diseases of lifestyle. Further, it is also well known that continuous attempts to lose weight also predispose a person to developing a distorted body image, unusual attitudes toward weight and eating, and, ultimately, eating disorders. The finding that never, or almost never, binging is a significant protective factor against the development of overweight/obesity in our study population implies that disordered eating might already be associated with the overweight/obese among the economically active groups in South Africa. Another factor that needs to be considered is the fact that, compared to White women, non-Westernized, and some groups of Westernized, Black women adopt a larger ideal body size, report greater body image satisfaction, are more accepting of being overweight, and are less likely to aspire to being thin. This fact could make it difficult to prevent or treat overweight/obesity in Black women. On the other hand, these obesity-tolerant attitudes could prevent Black women from developing eating disorders. Care should therefore be taken in the planning of weight management interventions to avoid unidimensional and simplistic emphasis on energy intake reduction through dieting and/or increase of energy expenditure. Rather, intervention planners should focus on all aspects of the prevention, treatment, and management of weight related problems, bearing in mind the particular cultural context, as is suggested in the multidimensional weight management paradigm developed by Senekal et al.

The lack of association between the intake of high fat food items and overweight/obesity in our study population could reflect the fact that we examined intake frequency of high fat food items, rather than total energy and total fat intake. Therefore, we still recommend that caution about the amount and the type of fat consumed should remain an important feature of any intervention program aimed at addressing obesity and diseases associated with lifestyle behaviors.

Bearing in mind the limitations of the sample, as well as of the self-reported data, we concluded that, in order to develop effective interventions aimed at the prevention or treatment of overweight/obesity as part of initiatives taken to address chronic diseases of lifestyle among economically active South Africans of all ethnic groups, the following should be borne in mind:

- Because all the respondents in the study had achieved at least primary school level education, educating students at the primary school level about healthful lifestyle behaviors will ensure that all South Africans become aware of the actions necessary to decrease the prevalence of obesity and chronic diseases of lifestyle at an early age. To achieve this type of approach, governmental legislation regarding the inclusion of the necessary messages in the content of primary school syllabi will be essential.

- Risk factors which need specific attention in the development of interventions for economically active South Africans include the following:
  - Generating early awareness of the genetic and environmental factors conducive to the development of obesity. Specific emphasis should be placed on the possibility of “inheriting” lifestyle patterns conducive to disease development in particular families.
  - Generating early awareness of the possibility that certain ethnic groups (Black and mixed ancestry) might be more susceptible to the development of obesity.
  - Generating early awareness of the importance of adequate levels of physical activity for health throughout the life cycle.

- To ensure effective weight loss and maintenance (preventing weight cycling), and to prevent the development of abnormal eating attitudes and behav-
ior such as binging, any weight management component of intervention program should follow the suggested multidimensional approach.51

In the development of a targeted intervention program, specific ethnic characteristics (eg, eating habits and obesity tolerant attitudes) should be taken into consideration.

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REFERENCES

Factors Associated with Overweight/Obesity - Senekal et al


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Design and concept of study: Senekal, Steyn, Nel
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Data analysis and interpretation: Senekal, Steyn, Nel
Manuscript draft: Senekal, Steyn
Statistical expertise: Senekal, Steyn
Acquisition of funding: Senekal, Steyn