

Citation:

Miura K, Greenland P, Stamler J, Liu K, Daviglius ML, Nakagawa H. Relation of vegetable, fruit, and meat intake to 7-year blood pressure change in middle-aged men: the Chicago Western Electric Study. *Am J Epidemiol* 2004;159:572-580.

PubMed ID: [15003961](#)

Study Design:

Prospective Cohort

Class:

B - [Click here](#) for explanation of classification scheme.

Research Design and Implementation Rating:

POSITIVE: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine relations of food intake to 7-year blood pressure change.

Inclusion Criteria:

- Participants from Chicago Western Electric Study

Exclusion Criteria:

- Missing baseline dietary assessments or baseline blood pressure or educational attainment
- Previously diagnosed diabetes mellitus
- Prior myocardial infarction
- Fewer than 3 follow-up examinations between 1960 and 1966

Description of Study Protocol:**Recruitment**

Subjects recruited from the Chicago Western Electric Study, a long-term prospective population study principally of coronary heart disease and its precursors; in 1957, 3,102 men were randomly selected from the 5,397 men aged 40-55 years employed for at least 2 years at the Hawthorne Works of the Western Electric Company in Chicago.

Design

Prospective Cohort Study.

Blinding used (if applicable)

Not applicable.

Intervention (if applicable)

Not applicable.

Statistical Analysis

Analyses conducted with generalized estimating equation method for longitudinal data to estimate the relation of baseline dietary factors to average yearly change in SBP or DBP. Analyses were serially adjusted for confounders in 5 estimating equations. Average values of baseline blood pressure by baseline food group intake, adjusted for age and other confounders, were also compared using ANCOVA.

Data Collection Summary:

Timing of Measurements

In 1958 and 1959, blood pressure was measured and nutrient intake assessed by comprehensive interview. Intake of 26 specific food groups also assessed. Blood pressure remeasured annually through 1966, as well as weight, serum cholesterol, medical history and physical exam, electrocardiogram and other items described previously.

Dependent Variables

- Blood pressure measured with standard sphygmomanometers

Independent Variables

- Dietary intake obtained twice, 1 year apart, by nutritionists using standardized interviews and questionnaires

Control Variables

- Age
- Weight at each year
- Alcohol consumption
- Calories
- Other Foods
- Height
- Education
- Smoking

Description of Actual Data Sample:

Initial N: Originally 2107 participants before exclusion criteria applied

Attrition (final N): 1710 employed men

Age: initially aged 41 - 57 years

Ethnicity: 65% were first or second generation Americans, predominantly of German, Polish or Bohemian ancestry. Most other men were descendants of Great Britain and Ireland.

Other relevant demographics:

Anthropometrics:

Location: Chicago

Summary of Results:**Other Findings**

Average SBP/DBP increase was 1.9/0.3 mm Hg per year, and average weight gain was 0.6 pounds/year.

Using most models, SBP of men who consumed 14 - 42 cups of vegetables in a month (0.5 - 1.5 cups/day) versus <14 cups a month (<0.5 cups/day) was estimated to rise 2.8 mm Hg less in 7 years ($p < 0.01$).

In all models, the SBP of men who consumed 14 - 42 cups of fruit a month versus <14 cups a month was estimated to increase 2.2 mm Hg less in 7 years ($p < 0.05$).

In all models, beef, veal, lamb and poultry intakes were related directly to a greater SBP/DBP increase ($p < 0.05$).

Author Conclusion:

The main findings in this 7-year blood pressure follow-up study of middle-aged employed men are as follows:

1. Higher intakes of vegetables and of fruits were related to less of an increase in SBP and DBP over time, independent of age, weight at each year and intake of other foods
2. Men with a higher intake of red meat (beef, veal, lamb and pork) had a significantly greater increase in blood pressure
3. Men with a higher poultry intake had a significantly greater annual increase in blood pressure, independent of other factors
4. Men with a higher fish intake tended to have less of an increase in blood pressure

In conclusion, results of this 7-year blood pressure follow-up study extend prior epidemiologic and short-term dietary trial data. They also lend support to the concept that blood pressure increase with age may be prevented by consuming a diet rich in fruits and vegetables and reduced in meat (except fish), in addition to other influences not studied here, such as reduced salt intake, avoidance of heavy alcohol consumption and weight control.

Reviewer Comments:

Large sample size. Dietary intake only measured at baseline and dietary data contain no information on dietary sodium, potassium, magnesium or fiber. No effort made to control for medication or vitamin/supplement use. Cutoffs for <14 cups or 14 - 42 cups/month seem arbitrary.

Relevance Questions

1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	N/A
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	N/A

Validity Questions

1.	Was the research question clearly stated?	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	Was the selection of study subjects/patients free from bias?	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	Yes
2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	Were study groups comparable?	Yes
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A

3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	Yes
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	Was method of handling withdrawals described?	Yes
4.1.	Were follow-up methods described and the same for all groups?	Yes
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	Yes
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	Was blinding used to prevent introduction of bias?	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	Yes
5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were intervening factors described?	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes

6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	???
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	No
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	Were outcomes clearly defined and the measurements valid and reliable?	???
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	No
7.6.	Were other factors accounted for (measured) that could affect outcomes?	No
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	Was the statistical analysis appropriate for the study design and type of outcome indicators?	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes
8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	N/A
8.6.	Was clinical significance as well as statistical significance reported?	Yes

8.7.	If negative findings, was a power calculation reported to address type 2 error?	N/A
9.	Are conclusions supported by results with biases and limitations taken into consideration?	Yes
9.1.	Is there a discussion of findings?	Yes
9.2.	Are biases and study limitations identified and discussed?	Yes
10.	Is bias due to study's funding or sponsorship unlikely?	Yes
10.1.	Were sources of funding and investigators' affiliations described?	Yes
10.2.	Was the study free from apparent conflict of interest?	Yes

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