

Operationalizing the Measurement of Socioeconomic Position In Our Urogynecology Study Populations:
An Illustrative Review

Michael Heit MD PhD¹, Nayera Guirguis MD¹, Nadine Kassis MD¹, Michelle Takase-Sanchez MD MS¹,
Janet Carpenter PhD RN FAAN²

¹Indiana University School of Medicine, Indianapolis, IN, United States

²Indiana University School of Nursing, Indianapolis, IN, United States

Corresponding Author:

Michael Heit MD PhD
1633 N Capitol Ave, Ste 436
Indianapolis, IN 46202
Fax # 317-962-2049
Tel # 317-962-6600
Email: mheitmd@gmail.com

Conflicts of Interest:

Michelle Takase-Sanchez is a paid consultant for Pelvalon, Inc and receives honorarium for board prep materials and lectures for America's OBGYN Board Review Course. For the remaining authors none were declared.

Source of Funding:

Self funded

Summary Sentence:

Proper collection of socioeconomic position data is an important first step in gaining a better understanding of race and ethnic disparities in urogynecology specific health outcomes in hopes of informing social policy and programs designed to reduce these disparities.

This is the author's manuscript of the article published in final edited form as:

Heit, M., Guirguis, N., Kassis, N., Takase-sanchez, M., & Carpenter, J. (2017). Operationalizing the Measurement of Socioeconomic Position in Our Urogynecology Study Populations: An Illustrative Review. *Female Pelvic Medicine & Reconstructive Surgery*, 23(3), 208–215.
<https://doi.org/10.1097/SPV.0000000000000353>

ABSTRACT

Objectives: The purpose of this illustrative review is to provide guidance for the measurement of socioeconomic position when conducting health disparities research in urogynecology study populations.

Methods: De-identified data was extracted from existing IRB-approved research databases for illustrative purposes. Attributes collected included the study participant's marital status, level of educational attainment (in number of years of school completed) and occupation as well as the study participant's last/only spouses' level of education and occupation. Average household and female socioeconomic position scores were calculated using two established composite indices: 1) Hollingshead Four Factor Index of Social Position, 2) Green's Socioeconomic Status scores, and two single item indices: 1) Hauser-Warren Socioeconomic Index of Occupation, 2) level of educational attainment.

Results: The Hollingshead Four Factor Index of Social Position more than the Hauser-Warren Socioeconomic Index of Occupation provides researchers with a continuous score that is normally distributed with the least skew from the dataset. Their greater standard deviations and low kurtotic values increase the probability that statistically significant differences in health outcomes predicted by socioeconomic position will be detected compared to Green's socioeconomic status scores.

Conclusions: Collection of socioeconomic data is an important first step in gaining a better understanding of health disparities through elimination of confounding bias, and for the development of behavioral, educational, and legislative strategies to eliminate them. We favor average household socioeconomic position scores over female socioeconomic position scores because average household socioeconomic position scores are more reflective of overall resources and opportunities available to each family member.

Introduction

Confounding bias can be introduced when data on socioeconomic position is unmeasured during retrospective and prospective health disparities research on urogynecology study populations. Racial and ethnic disparities in health outcomes including pelvic floor anatomy, and surgery for pelvic organ prolapse may be construed as signs of genetic differences or behavioral choices , when the socio-cultural consequences of economic position are not considered throughout the life cycle¹⁻². The “first injustice” describes the increased mortality rates among infants born to women with less than a high school education compared to college graduates. Age adjusted adult mortality rates are 2 to 3 times higher in people at the bottom of the socioeconomic continuum compared to those at the top³.

Socioeconomic position is defined as the hierachal position of an individual or family based on their access to or control over wealth, prestige, and power. This access or control provides the family or individual with the capacity to create or consume goods and services that are valued by society, such as health. It provides opportunities for healthy lifestyle choices, which are a collective pattern of activities or behaviors undertaken by people for the purpose of preventing illness, and maintaining or enhancing their health⁴. Socioeconomic position as a “fundamental cause” can have both direct effects on the physical and mental well-being (World Health Organization’s definition of health) of the individual or family, or indirect effects through mediators including access to healthcare, environmental exposure, and healthy lifestyle choices accounting for up to 80% of premature mortality^{3,5-6}. Disparities in health are less likely explained by the increased stress experienced by individuals or families occupying lower socioeconomic positions.

The purpose of this illustrative review is to provide guidance for operationalizing the measurement of socioeconomic position by investigators interested minimizing confounding bias when conducting health disparities research on their urogynecology study population. Identification of

socioeconomic position as a fundamental cause for health disparities rather than race, and ethnicity is the first step in improving health through legislative action and behavior change.

Material and Methods

Socioeconomic position is typically composed of three indicators that effect health including education, employment or occupational prestige, and income. Education typically includes the years of schooling and degree attainment indicating the requisite knowledge, skills, values, and behaviors necessary for job acquisition. Educational attainment, occupies the key position in the socioeconomic stratification of individuals, families or populations because it influences the likelihood of employment, the quality of the employed position (occupational prestige) and the resultant earned income. Well educated study participants are likely to be employed, work full time, and are more likely to find their work fulfilling, autonomous, less routine and dangerous. They earn higher incomes resulting in less economic hardship, perceive greater sense of control over outcome, healthy lifestyle choices, and have more social support compared to less educated study participants. Level of educational attainment is less likely to be influenced by disease in adulthood than occupation and income because of its upstream location along the explanatory path of socioeconomic position. For these reasons, education more than occupational prestige, or household income is the strongest determinant of the social distribution of physical and emotional well-being. However, economic returns differ across race/ethnic, and gender groups with minorities and women realizing lower incomes than white men arising from equal levels of educational attainment^{5,7}. Employment categorizes job status into employed full time, part time, unemployed, disabled, retired, full time student, or homemaker. Occupational prestige describes the conditions and qualities inherent in the job's activities. Occupational prestige provides the explanatory link between level of educational attainment and income, providing a measure of environmental and working conditions, latitude of decision making and psychological job demands. It is difficult to assign

occupational prestige scores to retirees, and homemakers and, like education, they do not account for race/ethnic, and gender differences in benefits arising from equal employment. Personal or household income is indicative of the material wealth or hardship of the individual or family unit, respectively. Income's effect on health depend on education whereby low income often results from low educational attainment explaining why income plays a subordinate role in measuring socioeconomic position. The subordination of income below educational attainment and occupational prestige in addition to the sensitivity of its data collection explains why composite measures of socioeconomic position often exclude income data from its calculation. Income measurement is problematic because the quality of goods and services available for purchase by low socioeconomic positioned individuals are poorer than those available to high socioeconomic positioned individuals. This further weakens the measurement of income beyond the aforementioned higher non response rates compared to other indicators of socioeconomic position⁸.

There are two distinct methods of measuring socioeconomic position for health disparities research in study populations. Some researchers choose a composite index based on formulas which account for the individual contributions of level of educational attainment, occupational prestige, and household income to a total socioeconomic position score. The advantage of composite indices is that they produce continuous data, which increases the variability of socioeconomic position scores compared to nominal or ordinal data such as income ranges or level of educational attainment. The variability of the composite index scores increases the probability of explaining health disparities through statistically significant associations when they truly exist. The disadvantage of composite socioeconomic position scores is that its calculation obscures the causal relationships amongst the individual indicators and their explanatory variance on health disparities. For example, level of educational attainment, occupational prestige, and income occupy an ordered position in the causal pathway linking socioeconomic position to health disparities when considered individually.

Most researchers favor the use of single item indices of socioeconomic position over composite indices because each indicator has both common and independent causal pathways linking them to health. Each indicator may be particularly salient for a specific study population or subgroup that can be obscured by the calculation of a composite index score. Single item indices eliminate the need for computational time during analysis. The decreased variability of socioeconomic position scores produced from ordinal single item indices such as employment status, income, and level of educational attainment can be overcome by increasing the number of response categories beyond six⁹. The single item occupational prestige scores provide continuous data combining the benefits of both composite and single item socioeconomic position indices.

We identified convenience sample of patients seen at our major metropolitan urogynecology clinical practice in the Midwest region of the United States between September 2013 and August 2014 who had previously consented to participate in one of two Investigational Review Board (IRB) approved research protocols for this illustrative review. Individuals completed a questionnaire used to measure level of educational attainment, and occupation for the study participant and their last/only spouse to operationalize the measurement of socioeconomic position as seen in Figure 1.

The two composite socioeconomic position indices chosen for this illustrative review were based on two selection criteria: 1) The indices were developed to study health behavior for epidemiologic research and 2) The indices did not require knowledge of female or household income.

Composite Indices of Socioeconomic Position

A. Hollingshead Four Factor Index of Social Prestige¹⁰

Hollingshead constructed his four-factor index by assigning scores to occupation and education levels, the weighted sum of which constituted an index of social prestige (ISP) dependent additionally on

the gender and marital status for that person. Prior occupation was considered for retired individuals.

One limitation of this index is its dependence on occupational titles used by the United States Census in 1970 that may not be relevant for today's needs. The four-factor index of social prestige (ISP) was calculated as follows:

$$\text{ISP} = (3 \times \text{Education}) + (5 \times \text{Occupation})$$

We calculated the individual female ISP score based solely on the level of educational attainment and occupation of the individual. The following principles were applied when calculating household average ISP score:

1. If married, the ISP score was calculated by summing the female and male ISP score and dividing by two. The index does not classify homemakers for calculation of an occupation score. The average household ISP score was equal to the working individual's ISP score when a male or female homemaker was present.
2. If separated, divorce, widowed or the marital status was unknown the ISP score was equal to the female head of household.

B. Green's Socioeconomic Status Index¹¹

The index was developed to partition variance in preventive health behaviors explained by socioeconomic factors so that other contributing variables, including knowledge and attitudes, could be analyzed independently. There are two and three factor indices, which include the weighted sum of education, and occupation or income, or all three, respectively. We choose to use the two-factor index because of the difficulties in collection of accurate income data from study populations due to its sensitive nature. Prior occupation was considered for retired individuals. Green's two factor Socioeconomic Status Index was calculated as follows:

Green's two factor SES index = (0.7 x Female head of household education score) + (0.4 x occupation score –female or male depending on highest score)

We calculated the individual female two factor SES index scores based solely on the level of educational attainment and occupation of that individual. The following principles were applied when calculating the average household Green's two-factor SES index:

1. Education of the female head of household was used instead of the male head because the educational level of the woman has been found to be more highly correlated with preventive health behavior.
2. If married, the highest occupational score assigned to either wife or spouse was used. This was done under the assumption that a higher occupational score was associated with a higher income potential.
3. If separated, divorced, widowed or the marital status is unknown then the occupational score was equal to the female head of household.

Single Item Indices of Socioeconomic Position

A. Hauser – Warren Socioeconomic Index of Occupations¹²

The Socioeconomic Index of Occupation for men, women, and all workers was based on the education and income of workers in the 1990 US Census validated against occupational prestige ratings from the 1989 General Social Survey conducted by the National Opinion Research Center (NORC). It updates the Duncan Socioeconomic Index (SEI), which ignored women, and its successors including the Nakao and Treas scales based on characteristics of both male and females in the 1980 US Census validated against occupational prestige ratings also from the 1989 General Social Survey. The benefit of the Socioeconomic Index of Occupations is its lack of reliance on income data.

Once again, we calculated the female socioeconomic index of occupations score using the female index tables available in the monograph. Prior occupation was considered for retired individuals. The following principles applied when calculating the average household socioeconomic index of occupations score:

1. If married, the socioeconomic index of occupations score was calculated by summing the female and male socioeconomic index of occupations scores and dividing by two.
2. If separated, divorce, widowed or the marital status is unknown the socioeconomic index of occupations score was equal to the female head of household.

B. Level of Educational attainment

We categorized level of educational attainment based on recommendations from Hollingshead's Four-Factor Index of Social Status because they could be easily mapped to the categories described for calculation of Green's Socioeconomic Status Index as seen in Figure 1.

Descriptive statistics, and frequency distributions of the characteristics of our study population and the two composite socioeconomic position index scores were calculated and graphed, respectively. Descriptive statistics and frequency distributions for the single item continuous Hauser-Warren Socioeconomic Index of Occupation scores were also calculated and graphed. Frequency distributions of responses from our study population for the single item, ordinal level of educational attainment indicator of socioeconomic position were graphed. Pearson's correlation coefficients were calculated to characterize the relationships between the three continuous measures of socioeconomic position (Hollingshead, Green, and Hauser- Warren). All analyses were carried out using Statistical Package for Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY:

IBM Corp). P values less than 0.05 were considered significant for the purpose of Pearson's correlation coefficient calculations.

Results

The mean age of the 308 patients from our study populations was 60 ± 12.5 years. The racial/ethnic breakdown of our study participants was 95% Non-Hispanic White, 4% Non-Hispanic Black, and 1% Hispanic. Descriptive statistics from the three continuous measures of socioeconomic position are provided in Table 1.

The Hollingshead Four Factor Index of Social Position (Figure 2a, b) more than the Hauser-Warren Socioeconomic Index of Occupation (Figure 3a, b) provides researchers with a continuous score that is normally distributed with the least skew in the dataset.

Green's average household and female socioeconomic status scores (Figure 4a, b) were more negatively skewed and less variable than the other two indices reflecting the use of the female head of the household's educational score and occupation when the female worker score was higher for both calculations. The frequency distribution of our single item ordinal level of educational attainment data is shown in figure 5.

Correlations between all three composite indices of socioeconomic position are all statistically significant ($p<0.05$) with the highest explanatory variances of the computational Hollingshead Four Factor Index of Social Position for Green's socioeconomic status scores index as noted in Table 2.

Discussion

Socioeconomic disparities rather than race or ethnicity are often the strongest predictors of health outcomes. The 2004 report Eliminating Health Disparities; Measurement and Data Needs, recognized the importance of collecting individual level socioeconomic position data, race/ethnicity,

acculturation, and language for documenting the nature of healthcare disparities and for the development of strategies to eliminate them⁸. This is why we feel it is important to provide researchers with guidance for operationalizing the measurement of socioeconomic position in an urogynecology study population. Our illustrative review suggests favoring the Hollingshead Four Factor Index of Social Position more than the Hauser-Warren Socioeconomic Index of Occupation because it provides researchers with a continuous score that is normally distributed with the least skew from the dataset. Their greater standard deviations and low kurtotic values increase the probability that statistically significant differences in health outcomes predicted by socioeconomic position will be detected if they truly exist, compared to Green's socioeconomic status scores. None of the *a priori* chosen continuous composite measures require collection of sensitive income data while the continuous single item Hauser-Warren Socioeconomic Index of Occupation score makes acquisition of level of educational attainment data unnecessary because these variables are accounted for in the occupational prestige score. This makes the continuous single item Hauser- Warren Socioeconomic Index of Occupation score the easiest average household and female measure of socioeconomic position to collect for health disparities researchers. Collection of average household socioeconomic position scores is favored over female scores because it is more reflective of overall resources and opportunities available to each family member. The single item ordinal level of educational attainment is a viable alternative for socioeconomic position measurement when occupational data is unavailable.

Epidemiologic research on urogynecology study populations typically identifies associations between exposures and disease either retrospectively or prospectively using case control or cohort study designs, respectively. Health disparities in disease prevalence or incidence may be incorrectly associated with race or ethnicity when confounding bias is introduced. Confounding bias is introduced when measures of socioeconomic position are either not collected or not controlled for by health disparities researchers. In 2013, approximately one in five US adults (22.2%) reported any disability

where the most frequently reported disability types were mobility (13%) and cognition (10.6%). Disability prevalences were most common among racial/ethnic minorities (Non-Hispanic Black, 29% v Hispanic 25.9% v Non-Hispanic White 20.6%), persons with annual household incomes < \$15,000/yr (46.9%), and those who had less than a high school education (39.8%)¹³. The readership of the Center for Disease Control's [CDC's] Morbidity and Mortality Weekly Report, including the news media¹⁴, missed seeing the "proverbial forest for the trees"¹⁵ by focusing on the racial dimension of disability rather than the socioeconomic disparities of the study participants in the 2013 Behavior Risk Factor Surveillance System (BRFSS) survey.

Race and socioeconomic position are inextricably related to each other and to health. Only 29% of Hispanics graduate from high school compared to 84.2% of Non-Hispanic Blacks and 87.6% of Non-Hispanic Whites. Furthermore, 13.9% of Hispanics graduate from college compared to 19.8% of Non-Hispanic Blacks and 30.3% of Non-Hispanic Whites¹⁶. These educational disparities likely explain part of the ethnic disparities in household income and poverty rates. The 2013 median household income for Non-Hispanic Whites were \$58,270 compared to \$40,963 for Hispanics, and \$34,598 for Non-Hispanic Blacks. Year 2013 poverty rates for Non-Hispanic Whites, Hispanics, and Non-Hispanic Blacks were 12.3%, 23.5%, and 27.2%, respectively¹⁷.

The health consequences of these socioeconomic disparities should be considered. Non-Hispanic Blacks are significantly more likely to report stroke (RR 1.52-2.03), diabetes (RR 1.98-2.38), and hypertension (RR 1.78-2.39) than age and gender matched Non-Hispanic Whites. These health disparities are reduced but not eliminated when socioeconomic status (education, and income) controls are added to the multivariable analysis (stroke RR 1.18-1.45, diabetes RR 1.72-2.08, hypertension RR 1.70-2.18). On the other hand, Non-Hispanic Blacks report less heart disease, cancer, and chronic lung disease compared to Non-Hispanic Whites matched for age and gender with further risk reductions seen

for heart disease and chronic lung disease after controlling for socioeconomic status. US born Hispanics are significantly more likely to report diabetes (RR 1.60-2.83) than age and gender matched Non-Hispanic Whites. Again this health disparity is reduced but not eliminated when controlling for socioeconomic status in the multivariable analysis (RR 1.39-2.23)¹⁸.

Residual effects of racial/ethnic disparities in health at similar levels of socioeconomic status may be explained by other measured or unmeasured variables in health disparities research. Differentially discriminative experiences including bias, stereotyping, cultural incompetence in the health care system, religiosity, spirituality, and residential segregation, may provide further explanatory variance for health disparities after controlling for socioeconomic position in a race and ethnically diverse study population⁸.

Health lifestyles describe a pattern of health related behaviors based on personal choices from these socioeconomic dependent opportunities including contact with the medical profession for preventive care and routine checkups^{3-4,7-8}, transportation to medical appointments, types of health insurance, type of healthcare facility and provider co-payment amount, availability for care (time off from work, available child care), support systems, and knowledge of appropriate care and attitudes toward health care.

Healthy lifestyle behaviors external to the health care delivery system including dietary decisions, exercise, smoking, alcohol consumption, drug abuse, coping mechanisms for stress and anxiety, relaxation and rest, personal hygiene, and automotive seat belt use, follow access and utilization of medical care as the most widely recognized mediators of the association between socioeconomic position and health. The health lifestyle behaviors of the upper/middle classes featuring more healthy diets, greater opportunity for relaxation and stress coping, higher levels of participation in sports and leisure time exercise, more physical checkups, and other preventive care activities assist the

affluent in leading healthier and longer lives. The lower classes, in turn make riskier choices from limited opportunities resulting in shorter life expectancy, and worse health than the classes above it⁴.

For example, socioeconomic status rather than race/ethnicity was associated with urinary incontinence knowledge as measured by the validated Incontinence Quiz¹⁹. Racial variations in prolapse surgery in the United States may be explained by differences in physician ascertainment and patient reporting of symptoms as well as access to and utilization of urogynecology care². Regular access to healthcare providers and active participation in health maintenance explain with racial group differences in healthcare seeking for urinary incontinence in black women²⁰.

Much of the medical sociologic research focuses on an attempt to identify the “magic bullet” or explanatory mediators between race, ethnicity, and health. In fact, the “magic bullet” might just be socioeconomic position itself suggesting that interventions designed to reduce socioeconomic disparities alone may have the greatest effect on the overall health of the general population. Individuals of higher socioeconomic position have likely reached “the ceiling” of improvements in health and life expectancy suggesting that improvements in income potential, better education, and housing will have the greatest impact on the overall health of individuals occupying lower socioeconomic positions⁵. Knowledge of the frequency distribution of socioeconomic position should begin to solve the explanatory puzzle surrounding health disparities in urogynecology study populations using structural equation modelling to establish the existence, strength, precision, and direction of causal pathways relating race and ethnicity to health and development of strategies to reduce disparities. See figure 6.

There are major limitations to our illustrative review that must be considered before our conclusions can be considered valid. While our convenience sample of patients are representative of our major metropolitan urogynecology clinical practice in the Midwestern region of the United States it is not generalizable to the US population based on census data for race and ethnicity. Both Non-

Hispanic Blacks and Hispanics are under-represented in our study population, which negatively skews the frequency distribution of all our measures of socioeconomic position making mean values a poorer measure of central tendency than median values. Operationalizing the measurement of socioeconomic position using our indices in a more race and ethnically diverse population is needed before a preferred method is chosen. The absence of sound measurement theory for operationalizing the measurement of socioeconomic position prevents any determination of 1) whether it should be considered an ordinal or continuous construct, and if ordinal how many categories, or 2) whether a single composite, or disaggregated measure is best, and for what purposes⁸. Socioeconomic position does not totally explain the racial/ethnic disparities in health despite our recommendation for measurement in health disparities research on urogynecology populations. Nonetheless, it does provide some explanatory variance for the association unrelated to the “color of one’s skin.” Race and ethnicity are “socio-cultural” constructs that describe relations between people and not the anatomic or physiologic qualities possessed by them. The explicit and implicit consequences of race and ethnic self-identification affect their socioeconomic position, and therefore life chances including health expectancy²¹. Our review highlights the need for measurement of other explanatory variables capable of providing insight into the “socio-cultural” construct and its relationship to health while socioeconomic controls are in place.

Socioeconomic position is a dynamic construct that changes over the life cycle. Therefore, cross-sectional measurement does not recognize that socioeconomic disadvantages likely begins in childhood, and may be cumulative, interfering with the future ability to gain social and economic advantage, and as a consequence good health⁸.

The American Psychology Association’s Office on Socioeconomic Status recommends contributions to the body of research on the societal barriers experienced by ethnic/racial minorities,

particularly those of lower socioeconomic position, and their impact on health and well-being through reports of study participant characteristics related to socioeconomic status²¹. We have provided an illustrative review for operationalizing the measurement of socioeconomic position on our urogynecology study populations. The Hollingshead Four Factor Index of Social Position more than the Hauser – Warren Socioeconomic Index of Occupations provide researchers with continuous data that is normally distributed with adequate spread of the frequency distribution increasing the likelihood that statistically significant differences will be detected, if they truly exist. Both of these indices do not require collection of income data while the Hauser – Warren Socioeconomic Index of Occupations additionally does not require collection of educational attainment data because these variables are accounted for in the occupational prestige score. The single item ordinal level of educational attainment is a viable alternative for socioeconomic position measurement when occupational data is unavailable.

Ultimately, collection of socioeconomic position data is an important first step in gaining a better understanding of race and ethnic disparities in health in hopes of informing social policy and programs designed to reduce these disparities.

References

1. Howard D, Delancey JO, Tunn R, Ashton-Miller JA. Racial differences in the structure and function of the stress urinary continence mechanism. *Obstet Gynecol.* 2000; 95(5):713-717.
2. Brown JS, Waetjen LE, Subak LL, et al. Pelvic organ prolapse surgery in the United States, 1997. *Am J Obstet Gynecol.* 2002 Apr; 186(4):712-716.
3. Link BG, Phelan JC. Evaluating the Fundamental Cause Explanation for Social Disparities in Health. In: Bird CE, Conrad P, Fremont AM, eds. *Handbook of Medical Sociology.* Upper Saddle River, New Jersey: Prentice-Hall, Inc; 2000:33-47.
4. Cockerham WC. The Sociology of Health Behavior and Health Lifestyles. In: Bird CE, Conrad P, Fremont AM, eds. *Handbook of Medical Sociology.* Upper Saddle River, New Jersey: Prentice-Hall, Inc; 2000:159-172.
5. Robert SA, House JS. Socioeconomic Inequalities in Health: An Enduring Sociological Problem. In: Bird CE, Conrad P, Fremont AM, eds. *Handbook of Medical Sociology.* Upper Saddle River, New Jersey: Prentice-Hall, Inc; 2000:79-97.
6. Shavers VL. Measurement of Socioeconomic Status in Health Disparities Research. *J Natl Med Assoc.* 2007; 99:1013-1020.
7. Mirowsky J, Ross CA, Reynolds J. Links Between Social Status and Health Status In: Bird CE, Conrad P, Fremont AM, eds. *Handbook of Medical Sociology.* Upper Saddle River, New Jersey: Prentice-Hall, Inc; 2000:47-67.
8. Oakes JM, Rossi PH. The Measurement of SES in Health Research: Current Practice and Steps Toward a New Approach. *Social Science & Medicine* 2003; 56:769-784.
9. Byrne BM. *Structural Equation Modeling with Amos: Basic Concepts, Applications, and Programming.* Mahwah, NJ: Lawrence Erlbaum Associates; 2001.

10. Hollingshead AA. Four-factor index of social status. Unpublished manuscript. 1975. Available at:
<http://psy6023.alliant.wikispaces.net/file/view/hollingshead+ses.pdf>. Accessed June 1, 2016.
11. Green LW. Manual for Scoring Socioeconomic Status for Research on Health Behavior. Public Health Reports. 1970; 85:815-827.
12. Hauser, RM and Warren, JR. Socioeconomic Indexes for Occupations: A Review, Update, and Critique. Sociological Methodology. 1997; 27:177–298.
13. Courtney-Long EA, Carroll DD, Zhang QC, et al. Prevalence of Disability and Disability Type Among Adults—United States, 2013. MMWR Morb Mortal Wkly Rep. 2015; 64:777-783.
14. Association of University Centers on Disabilities News Report, Prevalence of Disability and Disability Type Among Adults – United States, 2013, New Report from CDC-NCBDDD July 30, 2015. Available at:
http://www.aucd.org/ECP/template/news.cfm?news_id=11388&parent=0&parent_title=UCED_D&url=/ECP/template/news_mgt.cfm?type%3D406%26topic%3D14. Accessed June 1, 2016.
15. Leonard Pitts Jr. Police Violence Isn't Just a Black Problem. July 28, 2015. Available at:
<http://www.miamiherald.com/opinion/opn-columns-blogs/leonard-pitts-jr/article29223976.html>. Accessed June 1, 2016.
16. Educational Attainment by Race, Hispanic Origin, and Sex, Table 230. Statistical Abstract of the United States: 2012 (131st Edition). July 9, 2015. Available at:
<https://www.census.gov/library/publications/2011/compendia/statab/131ed/education.html>. Accessed June 1, 2016.
17. DeNavas WC, Proctor BD. Income and Poverty in the United States: 2013 Current Population Reports 2014:60-249. September 2014. Available at:
<https://www.census.gov/content/dam/Census/library/publications/2014/demo/p60-249.pdf>. Accessed June 1, 2016.

18. Crimmins EM, Hayward MD, Seeman TE. Race/Ethnicity, Socioeconomic Status, and Health. In Anderson NB, Bulatao RA, Cohen B, eds. *Critical Perspectives on Racial and Ethnic Differences in Health in Late Life*. Washington DC: National Academies Press; 2004:310-352.
 19. Kubik K, Blackwell L, Heit M. Does Socioeconomic Status Explain Racial Differences in Urinary Incontinence Knowledge? *Am J Obstet Gynecol*. 2004; 191:188-193.
 20. Berger MB, Patel DA, Miller JM, Delancey JO, Fenner DE. Racial Differences in Self-Reported Healthcare Seeking and Treatment for Urinary Incontinence Community-Dwelling Women from the EPI Study. *Neurourol Urodyn*. 2011; 30(8):1442-1447.
-
21. American Psychology Association. Ethnic and Racial Minorities & Socioeconomic Status. Available at: <http://www.apa.org/pi/ses/resources/publications/factsheet-erm.pdf>. Accessed June 1, 2016.
 22. Smaje C. Race, Ethnicity, and Health. In: Bird CE, Conrad P, Fremont AM, eds. *Handbook of Medical Sociology*. Upper Saddle River, New Jersey: Prentice-Hall, Inc; 2000:114-128.

- Figure 1 Questionnaire used to measure educational attainment level, and occupation scores for calculation of composite socioeconomic position index score
- Figure 2a, b Frequency distribution of the Hollingshead Average Household and Female Four Factor Index of Social Position
- Figure 3a, b Frequency distribution of the Hauser Warren Average Household and Female Socioeconomic Index of Occupation Scores
- Figure 4a, b Frequency distribution of the Green's Average Household and Female Socioeconomic Status Scores
- Figure 5 Frequency distribution of the Level of Educational Attainment (Numbers are % of patients attaining the educational level)
- Figure 6 Explanatory Mediators Including Socioeconomic Position For Racial And Ethnic Disparities In Urogynecology Specific Health Outcomes Research. Structural equation modeling required to establish the existence, strength, precision, and direction of the direct and indirect causal pathway between variables

Figure 1 Questionnaire used to measure level of educational attainment, and occupational prestige scores for calculation of composite socioeconomic position index score

<p>1. What is your marital status?</p> <p>a) Never married</p> <p>b) Married</p> <p>c) Separated or Divorced</p> <p>d) Widowed</p> <p>2. What educational level have you completed?</p> <p>a) Eighth grade or less</p> <p>b) Junior high school (9th grade)</p> <p>c) Partial high school (10th or 11th grade, including trade school)</p> <p>d) High school graduate (including trade school)</p> <p>e) Partial college (at least one year) or specialized training</p> <p>f) Graduate of 2 or 4 year college or specialized training</p> <p>g) Graduate degree</p> <p>3. If married, separated, divorced or widowed, what educational level did your last or only spouse complete?</p> <p>a) Eighth grade or less</p> <p>b) Junior high school (9th grade)</p> <p>c) Partial high school (10th or 11th grade, including trade school)</p> <p>d) High school graduate (including trade school)</p> <p>e) Partial college (at least one year) or specialized training</p> <p>f) Graduate of 2 or 4 year college or specialized training</p> <p>g) Graduate degree</p> <p>4. What type of work (job or occupation) do you do? If retired, what type of work did you do?</p> <p>5. If married, separated, divorced or widowed, what type of work (job or occupation) did your last or only spouse do? If retired, what type of work did he do?</p>
--

Figure 2a and b

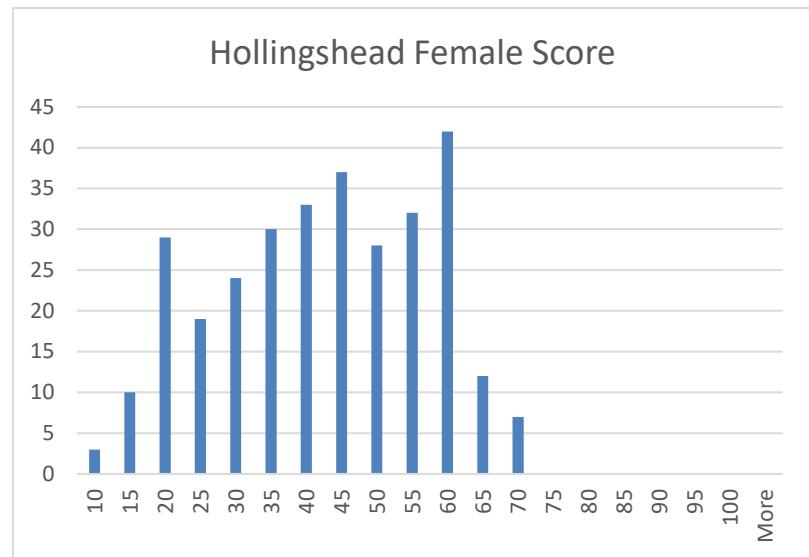
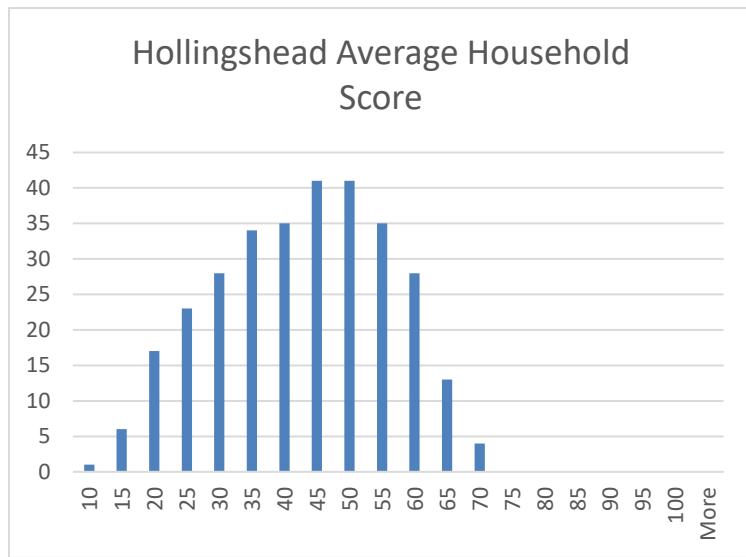


Figure 3a and b

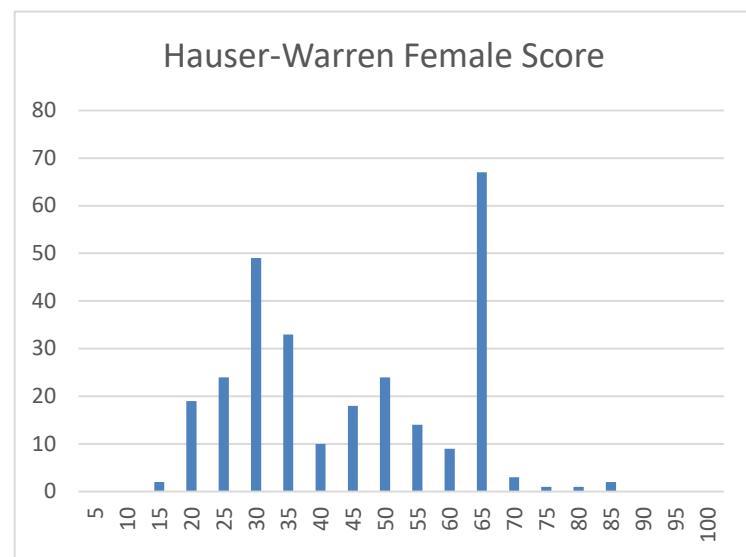
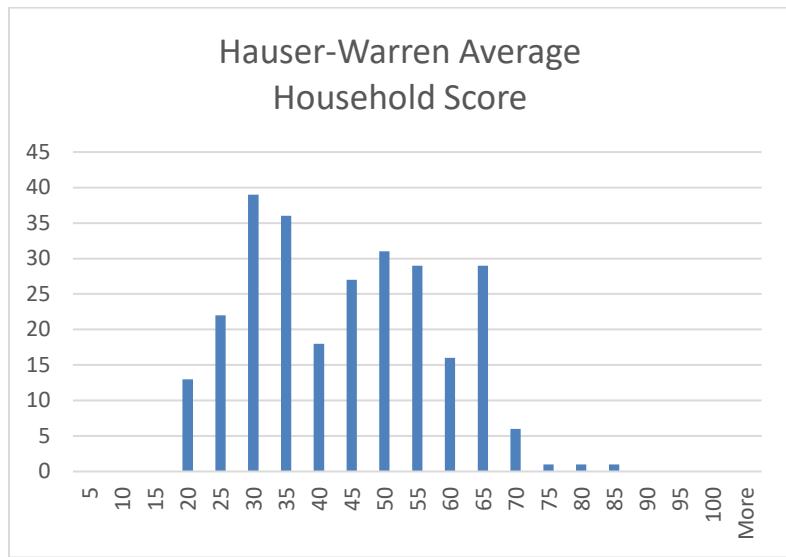


Figure 4a and b

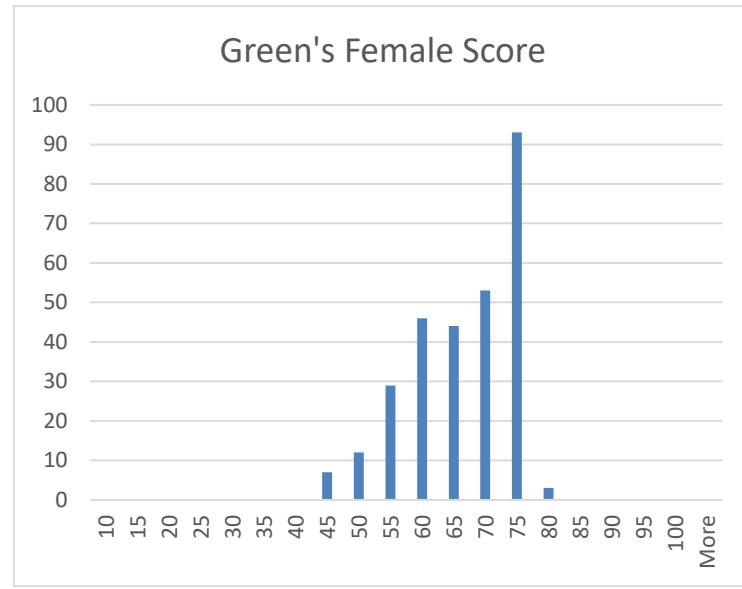
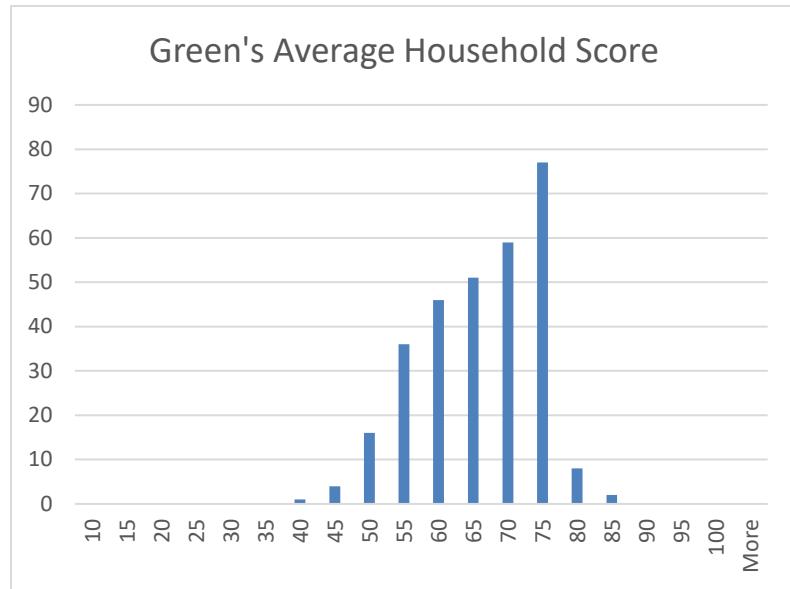


Figure 5

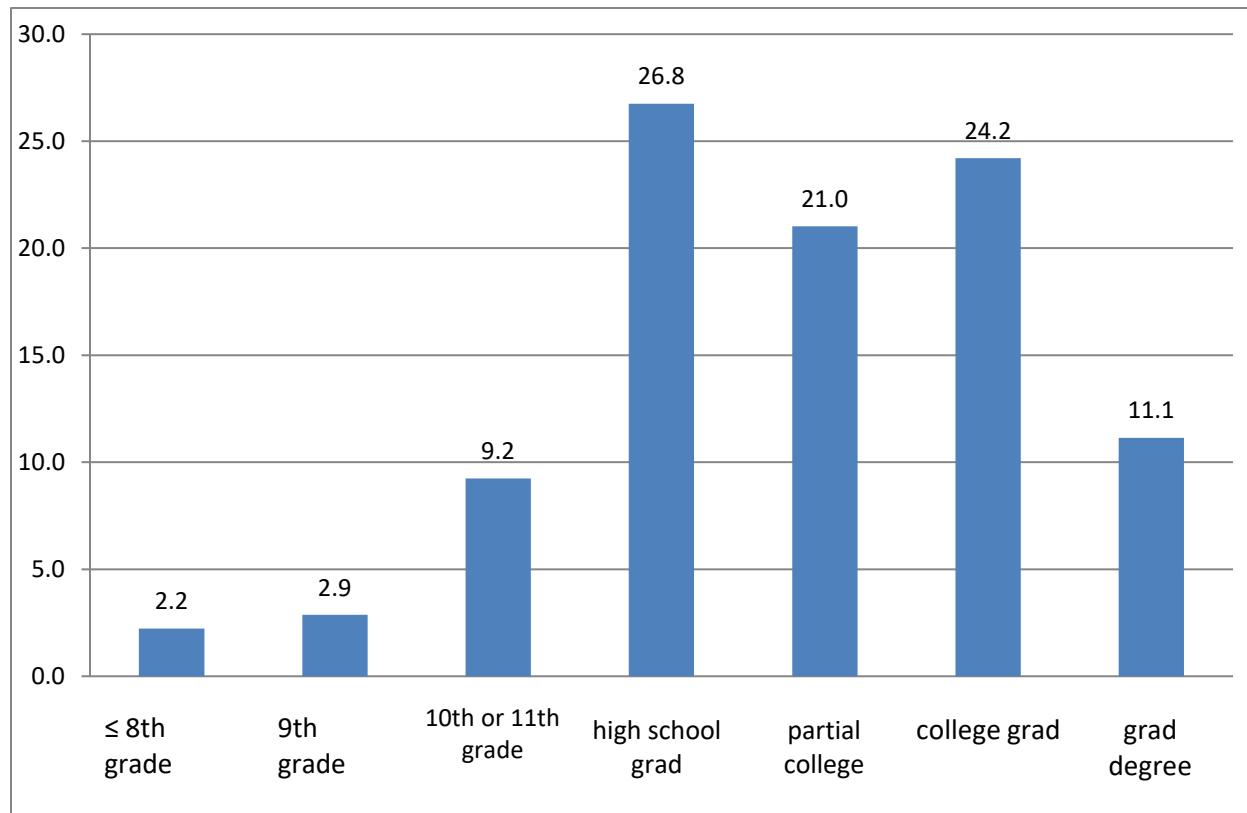


Table 1

Statistical Comparison of the three composite SES Indices

	Mean	Mode	Median	SD	Skew	Kurtosis	Min Value	Max Value	Range	25%ile	50%ile	75%ile
Hollingshead Female Index of Social Prestige Score	40.25	58.00	42.00	14.77	-0.26	-0.98	8.00	66.00	58.00	29.00	42.00	53.00
Hollingshead Family Average Index of Social Prestige Score	40.55	53.00	41.50	13.25	-0.21	-0.78	8.00	66.00	58.00	31.00	41.50	51.50
Hauser Warren Female Index of Occupations Score	41.27	61.07	40.38	16.14	0.17	-1.27	12.67	80.83	68.16	26.90	40.38	60.08
Hauser Warren Family Average Index of Occupations Score	41.03	61.07	41.24	15.80	0.19	-0.91	15.64	80.83	65.19	28.70	41.24	52.48
Green's Female SES Score	64.15	73.90	66.20	8.55	-0.54	-0.64	41.30	77.50	36.20	58.10	66.20	72.30
Green's Family Average SES Score	63.69	72.30	64.65	8.64	-0.42	-0.58	37.10	81.50	44.40	57.48	64.65	71.10

Table 2

Correlation coefficients for the Average SES scores for the three Indices. P < 0.05 for all correlations

	Green's SES Score	Hollingshead Index of Social Prestige Score
Household		
Hauser Warren Index of Occupations Score	0.718	0.762
Hollingshead Index of Social Prestige Score	0.815	
Female		
Hauser Warren Index of Occupations Score	0.751	0.796
Hollingshead Index of Social Prestige Score	0.853	

1. What is your marital status?

- a) Never married
- b) Married
- c) Separated or Divorced
- d) Widowed

2. What educational level have you completed?

- a) Eighth grade or less
- b) Junior high school (9th grade)
- c) Partial high school (10th or 11th grade, including trade school)
- d) High school graduate (including trade school)
- e) Partial college (at least one year) or specialized training
- f) Graduate of 2 or 4 year college or specialized training
- g) Graduate degree

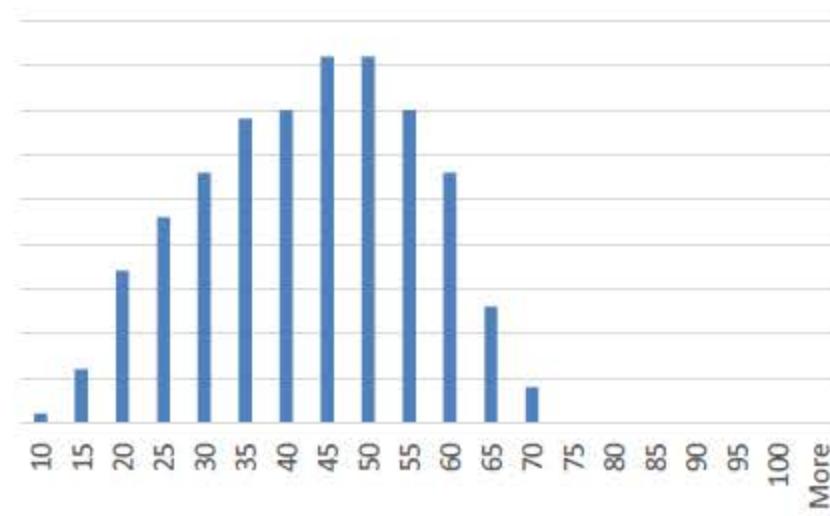
3. If married, separated, divorced or widowed, what educational level did your last or only spouse complete?

- a) Eighth grade or less
- b) Junior high school (9th grade)
- c) Partial high school (10th or 11th grade, including trade school)
- d) High school graduate (including trade school)
- e) Partial college (at least one year) or specialized training
- f) Graduate of 2 or 4 year college or specialized training
- g) Graduate degree

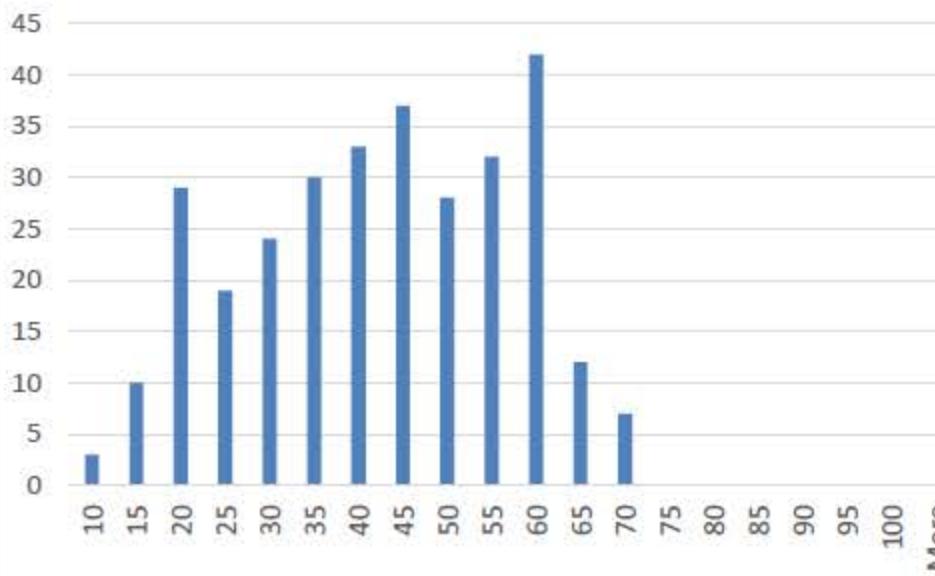
4. What type of work (job or occupation) do you do? If retired, what type of work did you do?

5. If married, separated, divorced or widowed, what type of work (job or occupation) did your last or only spouse do? If retired, what type of work did he do?

Hollingshead Average Household Score

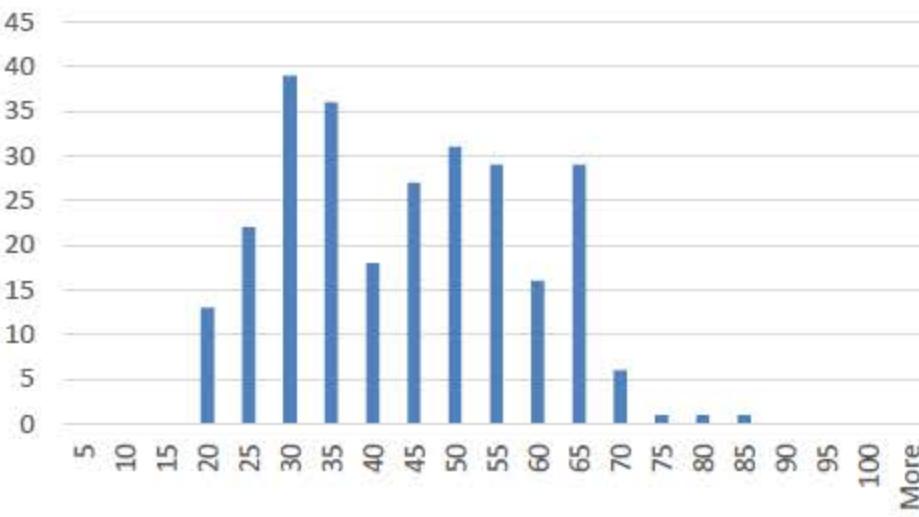


Hollingshead Female Score

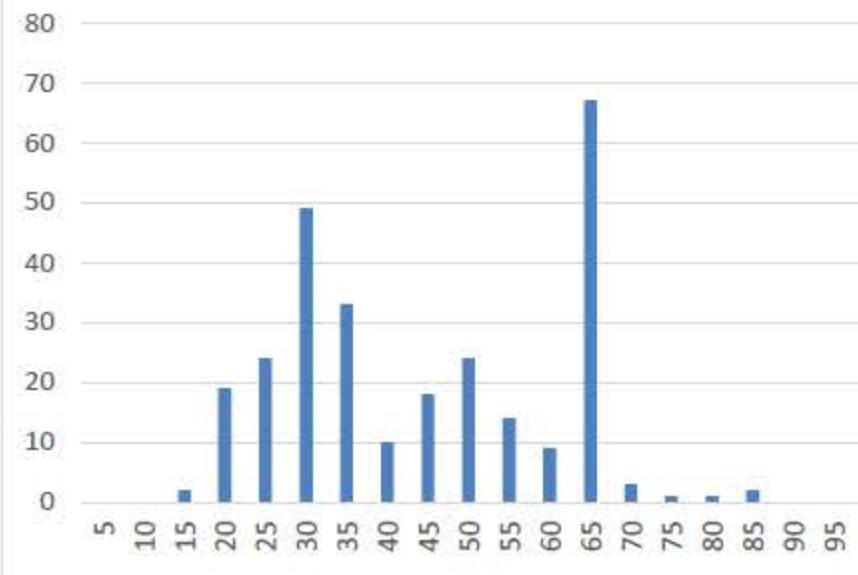


Hauser-Warren Average

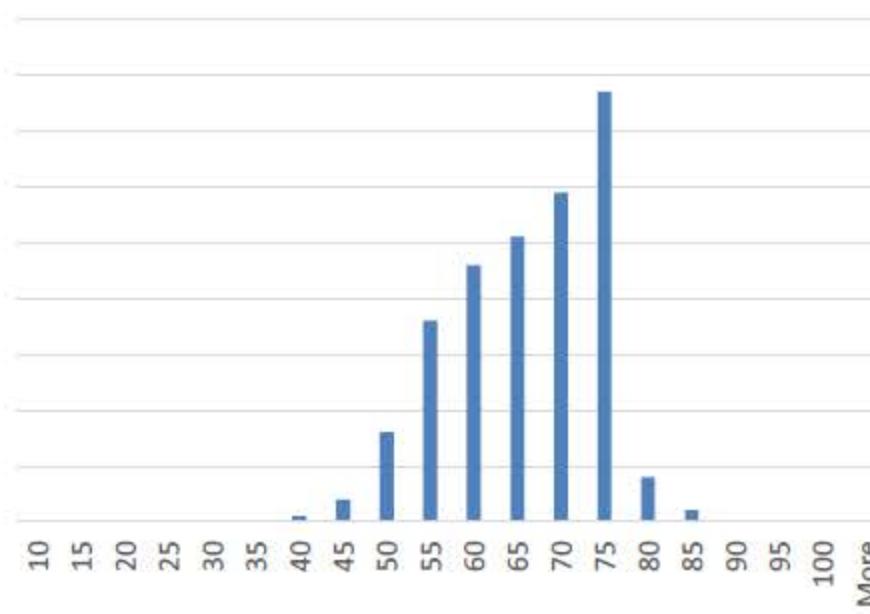
Household Score



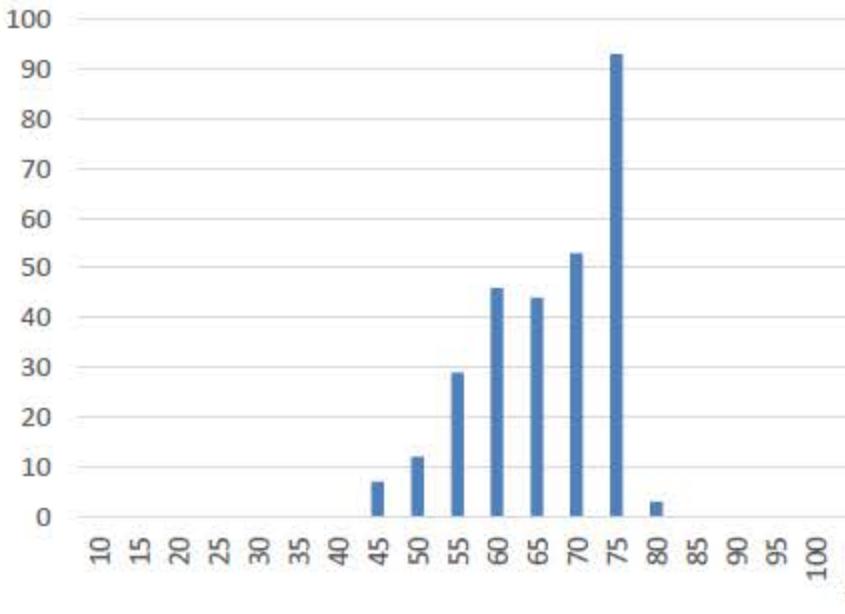
Hauser-Warren Female Score

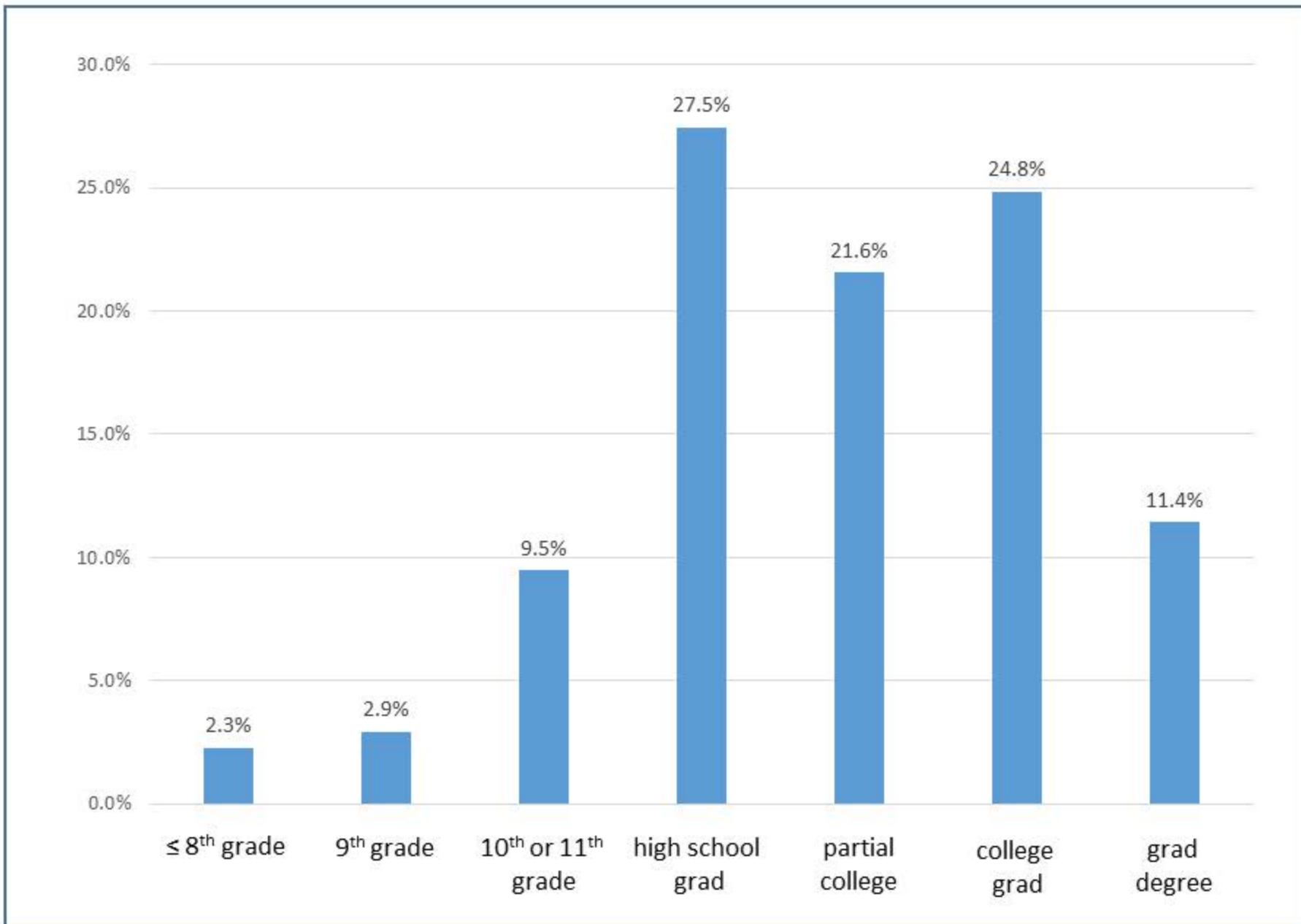


Green's Average Household Score



Green's Female Score





Study Population

Race

Ethnicity

Mediators

Socioeconomic Position

Access, Barriers, and Utilization of Care

Healthy Lifestyle behaviors

Cultural competence

Stereotyping, Bias

Religiosity, Spirituality

Outcomes

Clinical

Pain

Health related quality of life

Patient satisfaction

Anatomic/Subjective surgical success

Behavioral

Care seeking

Postoperative recovery

Treatment choice

Pelvic Floor Disorder Knowledge