SpringerOpen
Search articles
About the journal
Submit a manuscript
Advertising
Interviews conducted by Professor Martin Savage
Advertising
View all journals
Search
Log in
Sign up for alerts
RSS Feed

American Indian/Alaska Native (AIAN) adolescents and obesity: the influence of social determinants of health, mental health, and substance use

Michelle D. Johnson-Jennings, Ann Bell, Jessica Lee, William R. Hu-Lowe, Kristie S. Gross, John E. Dallas, Sarah M. Werner, Jenn Cherry, Amber L. Pitt-Johnson, Vanessa Hiratsuka, Cheryl Conway, Carolyn Kaufman

International Journal of Obesity (2019) | Cite this article
66 Accesses | Metrics

Abstract

Objective

To explore the prevalence of obesity among American Indian and Alaska Native (AIAN) adolescents aged 10–19 years in association with social determinants of health (SDOH), and mental health and substance use disorders.

Study design

Guided by the World Health Organization's Social Determinants of Health Framework, we examined data from the Indian Health Service Electronic Health Record Data Warehouse Clinic Patient Visit Fiscal Year 2015, supplemented by county level data from the U.S. Census and County Health Rankings. We used multivariate logistic regression to test the hypothesis that overweight/obesity is associated with SDOH, adjusted for mental health and substance use disorder status. We then fit a multivariable logit generalized linear model to calculate the relationship after adjusting for other individual and county level characteristics.

Results

We observed a prevalence of 32.0% for obesity, 13.8% for mental health disorders, and 5.0% for substance use disorders. Females had lower odds of obesity than males (OR = 0.76, p < 0.001), which decreased with age. Having Medicaid coverage (OR = 1.09, p < 0.05), residing in a county with lower education attainment (OR = 1.07, p < 0.05), and residing in a county with more Native people (OR = 1.04, p < 0.05) increased the odds of obesity. Mental health disorders, Residing in a county with higher poverty rates (OR = 0.73, p < 0.001) and residing in a county with a higher proportion of AIAN (OR = 0.93, p < 0.01) were associated with lower odds of obesity. These with mental health disorders had higher odds of obesity (OR = 1.28, p < 0.001). substance use disorders were associated with decreased odds of obesity (OR = 0.73, p < 0.001).

Conclusions

Our findings inform future obesity prevention and treatment programs among AIAN youth; in particular, the need to consider mental health, substance use, and SDOH.

This is a preview of subscription content, access via your institution

Access options

Access through your institution

Buy article
Get time limited or full access to article on ReadCube.
$32.00
Buy
Available on ReadCube

Subscribe to Journal
Get full access for 12 months
$199.00
Subscribe
Pro-rated payment offer
1/7 of the price for the remainder of the current subscription year

Additional access options:

- Log in
- Learn about institutional subscriptions

Data availability

The data that support the findings of this study are available from the United States Agency for Healthcare Research and Quality (AHRQ) Medical Expenditure Panel Survey (MEPS). Restrictions apply to the availability of the data, which are owned by the Urban Indian Health Institute and under approval for this study. Data requests must be submitted to the IHS National Institutional Review Board (nirb@ihs.gov), and to the Urban Indian IRBs, tribal councils and tribal authorities involved with the Indian Health Service Data Project.

References

1. Bullock A, Sheff K, Moore K, Manson S. Obesity and overweight in American Indian and Alaska Native children, 2005–2014. Am J Public Health. 2017;107:1467–69.
Article Google Scholar

2. Ivey-C, Carroll MD, Fryar C, Ogden C. Prevalence of obesity among adults and youth: United States, 2015–2016. In Statistics NCfHs, editor. Rockville, MD: Centers for Disease Control and Prevention; 2017.
Article Google Scholar

3. Tarabra ME, Mellitz ED, Chamberlain MN, Clark D, Cnop M, Greenbaugh A, Hanson RL, et al. Effect of severe obesity in childhood and adolescence on risk of type 2 diabetes in youth and early adulthood in an American Indian population. Pediatric Diabetes. 2019;20:923–9.
Article Google Scholar

4. Indian Health Service IHS. Newsroom: Disparities—Indian Health Service (IHS). 2015. http://www.ihs.gov/newsroom/factsheets/disparities/
Google Scholar

5. Tortolero R, Fulkerson E, Suzuki K, Hayashi H, Ishikawa-Takata K, Inada Y. Prevalence of non-alcoholic fatty liver disease in children and relationship to metabolic syndrome, insulin resistance, and waist circumference. Environ Health Prev Med. 2018;14:162–9.
Article Google Scholar

6. Kries S, Xu J, Curtin S, Bastian B, Tejada-Vera B. Mortality profile of the non-Hispanic American Indian or Alaska Population, 2016. National Center for Health Statistics (U.S.), editor. National Vital Statistics Reports. 2019;70.
https://www.cdc.gov/nchs/data/nvsr/nvsr70/nvsr70-02.pdf
Google Scholar

7. Soto D, Ivey K. A conceptual framework for action on the social determinants of health. Geneva: WHO Document Production Services; 2010.
Google Scholar

8. World Health Organization (WHO). WHO | About social determinants of health. World Health Organization; 2017. http://www.who.int/social_determinants/sdh_definition/en/
Google Scholar

9. Health HOOSo, Organization WH. Closing the gap in a generation: health equity through action on the social determinants of health: Final report of the Commission on Social Determinants of Health. Geneva: World Health Organization; 2008.
Google Scholar

10. US Department of Health and Human Services, Centers for Disease Control and Prevention, Office of Disease Prevention and Health Promotion. 2020. https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health
Google Scholar

11. Schell LM, Gallo WT. Overweight and obesity among North American Indian infants, children, and youth. Am J Hum Biol. 2012;24:302–12.
Article Google Scholar

12. Czyzowski K. Colonialism as a broader social determinant of health. Int Indig Policy J. 2011;2:9.
Article Google Scholar

13. Baldwin JA, Brown BG, Wayland C, Rhoades ER. Illness worldview, Culture and contexts influencing the relationship between stressful life events and risky behaviors in American Indian youth. Suicide Life Threat Life Threatening Behav. 2011;41:580–94.
Article Google Scholar

14. O'Connell JM, Kanim SE, Dee DL, Bass L, Whitworth S, Lahiff MA, Orlin KH, et al. Childhood characteristics associated with stage of substance use of American Indians: family background, traumatic experiences, and childhood behaviors. Addict Behav. 2007;32:1042–53.
Article Google Scholar

15. Whitbeck LB, Hoyt DR, Stiffman AR, Chen X, Stubblefield JD. Perceived discrimination and early substance abuse among American Indian children. J Health Soc Behav. 2001;42:405–24.
Article CAS Google Scholar

16. Johnson-Jennings MD, Bertsch A, Tran M, Walls ML, Walters KL. Racial discrimination's influence on smoking rates among American Indian/Alaska Native two-spirit individuals: a cross-sectional study. J Ethn Health Cure Plan Underserved. 2018;7:29–42.
Article Google Scholar

17. Shepherd CC, Li J, Cooper MN, Hopkins KD, Gerner RRH. The impact of racial discrimination on the health of Australian Indigenous children aged 5–10 years: analysis of national longitudinal data. Int J Equity Health. 2017;16:78–90.
Article Google Scholar

18. McCubbin LD, Antonio M. Discrimination and obesity among Native Hawaiians. Hawai J Med Public Health. 2012;71:346–52.
Google Scholar

19. Palmieri DL, Vinaratel M, Vandenbrink J. Life advance experience in relation with diabetes and binge eating disorder: a systematic review. J Behav Addic. 2018;6:311–21.
Article Google Scholar

20. Ellis TM, Ellis D, Johnson-Jennings M. General strain theory and substance use among American Indian adolescents. Race Justice. 2013;3:3–30.
Article Google Scholar

21. American Psychiatric Association. Mental health disparities: American Indians and Alaska Natives. American Psychiatric Association; 2013.
https://www.psychiatry.org/File%20Library/Research/Office-of-Minority-and-Ethnic-Affairs/Fact-Sheets/Fact-Sheets-Mental-Health-Disparities/Mental-Health-Facts-for-American-Indian-Alaska-Native.pdf
Google Scholar

22. Swain RC, Stanley LR. Substance use among American Indian youth: an examination compared with a national sample of US adolescents. J Child Adolesc Ment Health. 2016;28:89–96.
Article Google Scholar

23. Classen T, Hokayem C. Childhood influences on youth obesity. Econ Hum Biol. 2005;3:160–80.
Article Google Scholar

24. Mamerstein MR, Iacono WG, Legrand L. Obesity and depression in adolescence and beyond: recursive rates. Int J Obes. 2014;38:995.
Article Google Scholar

25. Wilson DM, Sale AP. Stress and paediatric obesity: what we know and where to go. Stress Health. 2016;30:91–102.
Article Google Scholar

26. DeLong K, Lanzer W, Kory M, Neumann-Schniter I, Wieler-Klein HM, Hinkel K. Factors associated with overweight and obesity in German Indian children and adolescents: findings from Hyderabad. Obes Sci. 2016;16:311–23.
Article Google Scholar

27. Jennings DM, Paul K, Little MM, Olson D, Johnson-Jennings MD. Identifying perspectives about school-based obesity intervention among urban, Kickstarted, American Indigenous children. Qual Health Res. 2020;30:894–905.
Article Google Scholar

28. O'Connell J, Cull S, Duclet J, Kendall J, Lu Y, Ting C, et al. Kickstarting a AIAN ACTION cooperative effectiveness of health care delivery systems for American Indian and Alaska Natives using enhanced data infrastructure: final report. Rockville, MD: Agency for Healthcare Research and Policy; 2014.
Google Scholar

29. US Department of Department of Health and Human Services, Centers for Disease Control. Healthy People 2020. Washington D.C. 2013. Accessed March 2016. http://www.healthypeople.gov
Google Scholar

30. Indian Health Service. Age and Gender of the IHS User Population. Fiscal Year 2015. Rockville, MD: Indian Health Service, MD: US Department of Health and Human Services; 2016. Accessed March 2017.
Google Scholar

31. US Department of Health and Human Services, CDC. School Charts. Centers for Disease Control and Prevention. Accessed March 1, 2016.
http://www.cdc.gov/nccdphp/dnpao/sch_charts.htm
Google Scholar

32. USDA Food Environment Atlas. USDA; 2019. http://www.ers.usda.gov/data-products/food-environment-atlas.aspx
Google Scholar

33. Hileman G, Steele S. Accuracy of claims-based risk scoring models. Schaumburg, Illinois; 2016.
Google Scholar

34. Indian Health Service. Age and Gender of the IHS User Population. Rockville, MD: Indian Health Service, MD: US Department of Health and Human Services; 2016. Accessed March 2017.
http://www.ihs.gov/dsd/weighted/age_gender.htm
Google Scholar

35. Hallmark B, Gesell S, Kaufman M, Waldron C, Suzuki L, Tinsley E, et al. Telehealth and adolescent obesity: do it, but do it carefully. J Adolesc Health. 2015;57:557–59.
Article Google Scholar

36. Hallmark B, Karpyn A, Tinsley E, Gesell S, Waldron C, Kaufman M, et al. Telehealth for underserved adolescents: preliminary results from the healthy weight clinic. J Pediatr Psychol. 2014;39:953–963.
Article CAS Google Scholar

37. Wilson DM, Sale AP. Stress and paediatric obesity: what we know and where to go. Stress Health. 2016;30:91–102.
Article Google Scholar

38. Pierce KK, Velasquez CE, Cerais JD, Wise SG, Lahiff LA. Youth substance use and body composition: does risk in one area predict risk in the other? J Youth Adolesc. 2012;41:14–26.
Article Google Scholar

39. Farhat T, Iannotti RJ, Simons-Morton BG. Overweight, obesity, youth, and health-risk behaviors. Am J Prev Med. 2010;38:258–67.
Article Google Scholar

40. DeLong K, Lanzer W, Kory M, Neumann-Schniter I, Wieler-Klein HM, Hinkel K. Factors associated with overweight and obesity in German Indian children and adolescents: findings from Hyderabad. Obes Sci. 2016;16:311–23.
Article Google Scholar

41. Jennings DM, Paul K, Little MM, Olson D, Johnson-Jennings MD. Identifying perspectives about school-based obesity intervention among urban, Kickstarted, American Indigenous children. Qual Health Res. 2020;30:894–905.
Article Google Scholar

42. O'Connell J, Cull S, Duclet J, Kendall J, Lu Y, Ting C, et al. KickStarting AIAN ACTION cooperative effectiveness of health care delivery systems for American Indian and Alaska Natives using enhanced data infrastructure: final report. Rockville, MD: Agency for Healthcare Research and Policy; 2014.
Google Scholar

43. US Department of Department of Health and Human Services, Centers for Disease Control. Healthy People 2020. Washington D.C. 2013. Accessed March 2016.
http://www.healthypeople.gov
Google Scholar

44. US Department of Health and Human Services, CDC. School Charts. Centers for Disease Control and Prevention. Accessed March 1, 2016.
http://www.cdc.gov/nccdphp/dnpao/sch_charts.htm
Google Scholar

45. USDA Food Environment Atlas. USDA; 2019. http://www.ers.usda.gov/data-products/food-environment-atlas.aspx
Google Scholar

46. Hileman G, Steele S. Accuracy of claims-based risk scoring models. Schaumburg, Illinois; 2016.
Google Scholar

47. Indian Health Service. Age and Gender of the IHS User Population. Rockville, MD: Indian Health Service, MD: US Department of Health and Human Services; 2016. Accessed March 2017.
Google Scholar

48. Centers for Medicare & Medicaid Services. CMS Chronic Care Data. Baltimore: Centers for Medicare & Medicaid Services. Accessed June 2016.
https://www.cms.gov/Research/Statistics-Data-and-Systems/Downloadable-Public-Use-File-Pufs/Chronic-Conditions/Adultsu
Google Scholar

49. Peterson L, Crockett A. Adolescent development health risks and opportunities for youth: positive underdog psychosocial explorations in American Indian. Sci Rev. 2016;2:1401–19.
Article Google Scholar

50. Erikson EH. Identity, youth, and crisis. New York: W. W. Norton; 1968.
Google Scholar

51. Arnett JJ. Emerging adulthood: a theory of development from the late teens through the twenties. Am Psychol. 2000;55:469–80.
Article CAS Google Scholar

52. Sawaoka HH. Gendered dimensions of obesity in childhood and adolescence. Pediat J. 2008;71.
Google Scholar

53. Frederick CB, Snellman K, Putnam RD. Increasing socioeconomic disparities in adolescent obesity. Proc Natl Acad Sci USA. 2014;111:1338.
Article CAS Google Scholar

54. Ellis TM, Johnson-Jennings M, Ellis DJ. Family structure and adolescent alcohol use: problems underlying popular explanations for American Indians. Sci Rev. 2016;2:1461–79.
Article Google Scholar

55. Lee-Rey E, Papadopulos A, Kaldor J, Bereznicki B, Peterson G, Bereznicki L. Overweight and obesity in American Indian and Alaska Native people aged ≥55 years. Public Health Nutr. 2019;1–11. https://www.cambridge.org/core/article/overweight-and-obesity-in-american-indian-and-alaska-native-people-aged-%E2%89%A5-55-years/4F1C5BD0D1A9B8B8C7D8D0A0A0A0A0/core-reader
Google Scholar

56. Brace AM, Moore TM, Mathews CL. Food deserts and overweight schoolchildren: evidence from Pennsylvania. Rural Sociol. 2018;78:703–27.
Google Scholar

57. Schaefli AA, Jensen DR, Hinrichs CC. Food deserts and overweight schoolchildren: evidence from Pennsylvania. Rural Sociol. 2018;78:703–27.
Google Scholar

58. Gerlach AF, Teufel-Shone NI, Drescher CF. Health promotion and diabetes prevention in American Indian and Alaska Native Communities—Traditional Foods Project, 2006–2016. MMWR Suppl. 2016;65:6–10.
Article Google Scholar

59. Warne D, Frizzell LL, American Indian Health Policy: historical trends and contemporary issues. Am J Public Health. 2014;104:1263–2.
Article Google Scholar

60. Goins RT, Conway F, Neff W, Jang L, Chang J, Huyser MR, et al. Risk factors of obesity in American Indian and Alaska Native people aged ≥55 years. Public Health Nutr. 2019;1–11. https://www.cambridge.org/core/article/risk-factors-of-obesity-in-american-indian-and-alaska-native-people-aged-%E2%89%A5-55-years/4F1C5BD0D1A9B8B8C7D8D0A0A0A0A0/core-reader
Google Scholar

61. Brace AM, Moore TM, Mathews CL. Food deserts and overweight schoolchildren: evidence from Pennsylvania. Rural Sociol. 2018;78:703–27.
Google Scholar

62. Schaefli AA, Jensen DR, Hinrichs CC. Food deserts and overweight schoolchildren: evidence from Pennsylvania. Rural Sociol. 2018;78:703–27.
Google Scholar

63. Kaiserman MR, Marcus MD, Lanthier MEL, Cravioto MC, Pfleiderer PB, Wingham RW, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. Author details2. Am J Psychiatry. 2007;164:328.
Google Scholar

64. Liu LJ, Hay P, Touyz S, Sainsbury A. Obesity with comorbid eating disorder associated with health and treatment expenditures. Nutrients. 2018;10:639–39.
Article Google Scholar

65. Whitegoat M, Vu J, Thompson K, Gallagher J. Mental health in diabetes prevention and intervention programs in American Indian/Alaska Native Communities. Wash Univ J Law Policy. 2018;56:269–310.
Google Scholar

66. Johnson-Jennings MD, Paul K, Olson D, LaRose M, Jennings D, Oehler-Stinnett J. Obesity prepping and plotting gardening as an Indigenous childhood health intervention. J Health Care Poor Underserved. 2020;31:871–88.
Article Google Scholar

67. Huang DY, Lanza H, Anglin MD. Association between adolescent substance use and obesity in young adulthood: a group-based dual trajectory analysis. Addict Behav. 2013;38:2833–8.
Article Google Scholar

68. Pierce KK, Velasquez CE, Lahiff LA, Wise SG, Perry CL. Adoption of risk-related factors among adolescent substance users: implications for weight status and implications for sexual behaviors. J Youth Adolesc. 2008;41:987–99.
Article Google Scholar

69. Eisenhardt AN, Cortez MR, Bosanquet KD. Food adoption: an examination of the diagnostic criteria for dependence. J Addict Med. 2009;3:127–32.
Article Google Scholar

70. Johnson-Jennings M, Johnson-Jennings A, Jennings D. Land-transforming plant: land as a culturally appropriate service for health interventions among Indigenous persons. International Medical and Health Sciences Conference Paper. Phoenix, Thailand: Research Flow; 2018. p. 8.
Download references

Funding

The research reported in this publication was supported by the National Institutes of Diabetes and Digestive and Kidney Diseases (NIDDK) of the National Institutes of Health under Award Numbers P20DK097093 DSMC and R01DK74757-02 and 3R01 DK74757-02 S1. Thanks for the assistance of the data collaborators, utilized in the reported analyses, provided by the Agency for Healthcare Research and Quality: Grants 2R01HS018501-11 R01HS, 2R01 and the Medical Expenditure Panel Survey (MEPS). The Urban Indian Health Institute (UIHI) received additional support from CMA and NM-IHI-HSD-180273-75-25. The content of this report is solely the responsibility of the authors and does not necessarily represent the official views of the funding organizations. The data used in the secondary analysis stem from project, known as the Indian Health Service (IHS) Electronic Health Record Data Project. The data set was created by the Urban Indian Health Institute (UIHI) and the Indian Health Service (IHS) in collaboration with the guidance and advice of IHS and Tribal Health program colleagues, as well as members of the project's Steering, Project Data, and Patient Committees. Members of Patient and Tribal Advisory boards, Tribal Councils, and Tribal Leaders in Oklahoma, consented to allow the health concerns they have for their Tribal members and how they hope this project would benefit their Tribes. The Tribal Leaders and Elders gave their approval. This research would not be possible without the generous gifts given to Save Mankind by our national ancestors.

Author information

Authors and Affiliations

Indigenous Wellness Research Institute, University of Washington, Seattle, WA, USA
Michelle D. Johnson-Jennings

Department of Health Systems, Management and Policy, Colorado School of Public Health, University of Colorado Denver, Denver, CO, USA
Margaret Reid

Department of Epidemiology and Biostatistics, University of California, Irvine, Irvine, CA, USA
Lushia Jiang & Jenny Chang

Department of Sociology, The University of British Columbia, Vancouver, BC, Canada
Kimberly K. Huyser

Centers for American Indian and Alaska Native Health, School of Public Health, University of Colorado Anschutz Medical Campus, Aurora, CO, USA
Anjani S. Bhuiya, John F. Dallas, Sarah M. Werner & Jenn O'Connell

Institute for Health Research, Kaiser Permanente Colorado, Aurora, CO, USA
John F. Dallas

Institute for Research and Education to Advance Community Health (IREACH), Department of Health Education and Clinical Sciences, Washington State University, Seattle, WA, USA
Amber L. Pitt-Johnson

Research Department, Southcentral Foundation, Anchorage, AK, USA
Vanessa Hiratsuka

Charles George Veterans Medical Center, Asheville, NC, USA
Cheryl Conway

Contributions

MDJ conceptualization, original draft preparation, methodology, data curation, formal analysis, writing-review and editing, project administration, WR methodology, formal analysis, data curation/management, visualization, writing-reviewing and editing. L.J. methodology, visualization, formal analysis, data curation/management, writing-reviewing and editing. KHJ conceptualization, methodology, writing—review and editing. AGB project administration, writing—review and editing. JFD conceptualization, methodology, data curation, writing—review and editing. ALPJ conceptualization, conceptualization, writing—review and editing, project administration. SMW, conceptualization, supervision, validation, writing—reviewing and editing, funding acquisition, project administration. JC, data curation, writing—reviewing and editing. KJC writing-reviewing and editing. CC, writing-reviewing and editing. JO, supervision, conceptualization, methodology, data curation, investigation, methodology, writing-reviewing and editing.

Corresponding author

Correspondence to Michelle D. Johnson-Jennings.

Ethics declarations

Competing interests

The authors declare no competing interests.

Additional information

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Rights and permissions

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.

Reprints and Permissions

About this article

Cite this article

Johnson-Jennings, M.D., Reid, M., Jiang, L., and American Indian/Alaska Native (AIAN) adolescents and obesity: the influence of social determinants of health, mental health, and substance use. Int J Obes (2019). https://doi.org/10.1038/s41366-020-0539-7

Download citation

Received
Revised
Accepted
Published
07 Jan 2019
07 Jan 2020
07 Jan 2020
07 Jan 2020

Published
07 February 2023

DOI
https://doi.org/10.1038/s41366-022-01236-7

Subjects

Epidemiology | Risk factors

International Journal of Obesity (*Int J Obes*) | ISSN 1476-5497 (online) | ISSN 0307-0565 (print)

About Nature Portfolio
About us
Press releases
Press office
Contact us

Discover content
Journals A-Z
Articles by subject
Nano
Protocol Exchange
Nature Index

Publishing policies
Nature portfolio policies
Open access

Author & Researcher services
Reprints & permissions
Research data
Language editing
Scientific editing
Nature Masterclasses
Nature Research Academies
Research Solutions

Libraries & institutions
Librarian service & tools
Librarian portal
Open research
Recommend to library

Advertising & partnerships
Advertising
Partnerships & Services
Media kits
Branded content

Career development
Nature Careers
Nature Conferences
Nature events

Regional websites
Nature Africa
Nature China
Nature India
Nature Italy
Nature Japan
Nature Korea
Nature Middle East

Privacy Policy | Use of cookies | Manage cookies/Do not sell my data | Legal notice | Accessibility statement | Terms & Conditions
California Privacy Statement

© 2023 Springer Nature Limited