Strengthening WIC's Impact During and After the COVID-19 Pandemic

Healthy Eating Research

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Introduction

Women who are pregnant or postpartum, infants, and young children require nutritional supports critical for healthy development and postpartum recovery. The United States Department of Agriculture (USDA) Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was created to supplement essential nutrition to each of these populations and is widely considered to be one of the most successful nutrition intervention policies for improving maternal and child health.[1] Since 1972, this targeted federal nutrition assistance program has safeguarded the health of women who are pregnant, postpartum, and/or lactating; infants; and children up to 5 years old who are at nutritional risk and living in or near poverty (≤185% of the Federal Poverty Level).[2-4] Before the COVID-19 pandemic, WIC assisted more than 6 million income-eligible participants monthly—including roughly half of all infants born in the United States.[5]

Unprecedented increases in unemployment as a result of the COVID-19 pandemic,[7] which are already larger than those during the Great Recession,[8] have increased WIC enrollment—a trend that is likely to persist for years to come.[9] Food insecurity—or lack of reliable access to healthy food—is also increasing.[10,11] This rapid increase in need requires WIC program flexibilities and contingencies to safely serve eligible program participants. It also provides opportunities to strengthen WIC's impact during and after this pandemic. This brief (1) summarizes evidence on the effectiveness of WIC; (2) discusses key challenges, program adaptations, and needs resulting from COVID-19, including WIC provisions in the federal COVID-19 stimulus packages to date (additional stimulus packages are expected); and (3) identifies critical knowledge gaps and opportunities with the greatest likelihood to shape future WIC policy and practice.

The Effectiveness of WIC: A Summary of the Evidence

WIC plays a crucial role in improving lifetime health[3,4] and these benefits are well established in the scientific literature for both mothers and children (Table 1). Updates to the WIC package in 2009[12] that increased fruits, vegetables, whole grains, and lower-fat milk, and expanded cultural food options resulted in additional positive changes to health and well-being (Table 2). Evidence is also developing regarding the cost-effectiveness of different facets of the WIC program.[13] For example, when considering how WIC's programs for prenatal care impact birth outcomes, a $1 WIC investment is estimated to save about $2.50 in medical, educational, and worker productivity costs due to WIC's reduction in pre-term births and improved health and development.

About WIC

Administered by the USDA, WIC provides federal grants to states (including Indian Tribal Organizations, the District of Columbia, and five territories) for supplemental food and beverages (called a nutrition prescription or the WIC food packages[6]), and to oversee essential WIC activities. States administer the WIC program by:

- Certifying participants' eligibility.
- Managing enrollment and recertification.
- Providing nutrition education (contacts at least every 6 months).
- Providing referrals to healthcare and other social services.
- Providing breastfeeding promotion and support.
- Distributing and tracking benefits.
- Working with certified retailers to provide WIC-eligible foods and beverages.

Table 1.

Summary of Evidence of WIC Benefits on Mothers and Children

WIC Benefits	Key Findings
Improvements in infant and child health outcomes	Decreased low- and very-low-birthweight births (e.g., raised birthweight by 25-75 grams);[14-19] decreased premature births;[14,20,21] decreased perinatal[20] and postnatal death;[21] reduced hospitalization time for mothers and children after birth;[17] and a reduced likelihood of stillbirth among black mothers[22]
Improvements in nutrient intake and diet-related outcomes	Improved intakes of calcium, potassium, and zinc among children;[23] and reduced iron deficiency anemia among children[24-26]
Improvements in short-term cognitive development and longer-term reading and math learning	Meaningful short-term cognitive benefits associated with prenatal/early childhood exposures to WIC[27]
Improvements in access to health care	Greater use of routine health services (e.g., well-child checkups, early pediatric screenings),[28] immunizations,[29,30] and oral health care[31]

Table 2.

Summary of the Evidence on Benefits of the 2009 WIC Food Package Changes

WIC Benefits	Key Findings
Improved neighborhood food environments	Increased availability of healthy foods and beverages on shelves of WIC-participating stores, especially in low-income neighborhoods (benefitting non-WIC consumers too)[32]
Improved food purchases, diet quality, and intake	A systematic review identified 20 articles and found improved dietary intake and an increase in the availability of healthier foods and beverages in authorized WIC stores;[33] individual studies, for example, have reported an 11 percent decrease in calories purchased by WIC households;[34] increased Healthy Eating Index scores among mothers[35] and children,[36] and improved fruit, vegetable, and whole grain consumption among children[37-39]
Reversal and reduction of rapidly increasing childhood obesity trends	Before the 2009 WIC food package change, the prevalence of obesity across states among 2- and 4-year-old WIC participants was increasing by 0.23 percentage points annually and after 2009, the trend was reversed;[40] fully formula-fed infants receiving the updated child food package had a 6-7 percent reduced risk of obesity compared to fully formula-fed infants who received the child food package before the 2009 update[41]
Increased rates of breastfeeding among WIC participants	Disparities in prevalence of babies who were ever breastfed between WIC-eligible participants and nonparticipants have been eliminated since the 2009 WIC revision[42,43]

COVID-19 Impacts & Responses

WIC participants and providers are already experiencing the impacts of COVID-19. Social distancing has rapidly changed prenatal, postnatal,[44] and pediatric[45] healthcare and complicated essential WIC activities (e.g., providing benefits, counseling, nutrition education, lactation consultation). COVID-19 has also strained food systems, especially for families living in or near poverty, including WIC participants (e.g., increasing food prices; causing shortages of staple items such as milk, eggs, bread, beans—many of which are included in WIC packages).[11,46,47] Women who are pregnant or postpartum, infants, and young children may be particularly vulnerable to these disruptions given their unique nutritional needs. As noted earlier, skyrocketing unemployment[7] and increasing food insecurity,[10,11] among other factors, will contribute to additional increases in WIC enrollment.[9] An initial response to these challenges (more are expected) was passage of the Families First Coronavirus Response Act (P.A. 116-127) by Congress. This legislation included several important WIC provisions:

(1) appropriated $500 million for FY2020 to support anticipated increases in WIC enrollment, common and critical during widespread economic hardship.[9]

(2) authorized the USDA to waive WIC regulatory requirements at a state's request, including the physical presence requirement.

Below, we summarize current actions that have been implemented (as of the date of publication) to support WIC implementation during and after the pandemic—efforts that are changing on a rapid basis. Future actions are also being explored that could help maximize the full potential of this program.

Protecting WIC Participants and Providers from COVID-19 Exposure

Efforts to date

The USDA has approved the following waivers for the WIC program during this pandemic:[48]

- Physical presence waivers remove requirements for in-person office visits at enrollment or re-enrollment and provide the flexibility to postpone lab tests (i.e., bloodwork) or weight and length/height measurements typically required to determine eligibility.
- Remote issuance waivers suspend requirements for in-person pickup of vouchers/checks or electronic benefits transfer (EBT) cards, instead allowing benefits to be sent by mail, delivered curbside at WIC clinics, or loaded to EBT cards remotely.
- Extended benefit issuance waivers allow state agencies to issue up to four months of benefits at one time to reduce the need for physical contact.

Additional actions needed

- **Evaluation and training for telehealth:** During social distancing, WIC agencies have unique opportunities to implement and evaluate telemedicine approaches to deliver counseling, provide referrals to healthcare and other social services, and provide nutrition education, among other activities that have traditionally taken place in-person. This has been a long-time interest of a variety of program stakeholders who advocated for and have been supporting the implementation of the $8.5 million WIC Telehealth Innovations Project launched in 2019 (P.L. 116-6).[49] Telehealth approaches have expanded rapidly during COVID, and support for training and technical assistance on new virtual platforms for delivering remote service—including by phone, text, or through social media—is essential, as these technologies may be new for both participants and providers. Evaluation of the effectiveness and reach of telehealth approaches should also address concerns about accessibility challenges for households and providers without reliable internet access and any potential data privacy issues.
- **Expand online WIC food package ordering:** Improved implementation and expansion of online WIC food package ordering with curbside payment and pickup and/or home delivery can mitigate concerns about viral exposure in stores and ensure access to WIC food package items. As mandated in the 2014 Farm Bill (P.L. 113-79), the USDA recently initiated online grocery purchasing pilots in the USDA Supplemental Nutrition Assistance Program (SNAP), now available in an expanding number of states and the District of Columbia.[50] Efforts should be made to: support the expansion of online purchasing options for WIC participants in future legislation; support WIC-specific pilot projects; and build technology and capacity—especially as questions arise about safety net responses in future pandemics. Retailers will play an important role in the expansion of online pilots in WIC through collaborations with state agencies. Increased online shopping among WIC participants should be accompanied by rigourous evaluations to understand whether this shift is accompanied by increased exposure to unhealthy food marketing (e.g., toddler formula or sugary beverages), which may impact non-WIC purchases made while shopping online.[51,52]

Ensuring Access to WIC Foods, Beverages, and Infant Formula

Efforts to date

The USDA has approved the following waivers during this pandemic:[48]

- Minimum stocking requirements and vendor-monitoring visits as vendors experience stocking challenges and supply chain disruptions.
- Food package substitutions that allow flexibility in type, size, or brand of specific foods if WIC-approved versions are not available. Current waivers include flexibility in the fat content of milk, increases in the size of approved whole grain items, and increases in the count of eggs, among others.

WIC vendors, independently and with the support of WIC agencies and advocacy organizations,[53] are also working to ensure participants retain access to approved items by placing limits on WIC-approved item purchases by non-WIC customers and enacting special shopping hours (e.g., early morning, immediately following restocking) for women who are pregnant or postpartum and mothers with young children.

Additional actions needed:

- **Expand Pandemic-Electronic Benefits Transfer (P-EBT):** Congress could consider expanding Pandemic-Electronic Benefits Transfer (P-EBT) to children enrolled in WIC who also participate in the USDA Child and Adult Care Food Program when their childcare center is closed and/or to SNAP households with children under 6 years old. During school closures, P-EBT provides families with children eligible for free and reduced-price meals up to $5.70 per day (per school-aged child) for the purchase of food similar to SNAP benefits. The Heroes Act (H.R. 6800, Sec. 180003), the latest federal aid bill currently before Congress, would allow states to include children enrolled in eligible childcare programs.
- **Increase the WIC Fruit and Vegetable Cash Value Voucher (CVV):** Congress could also consider increasing WIC benefits by boosting the fruit and vegetable CVV, which currently ranges from $8 to $11 and can be used toward the purchase of fruits and vegetables to encourage consumption of these foods. Increasing the CVV in response to COVID-19 could support healthy dietary intake and development while providing families with much-needed financial assistance. The Heroes Act (H.R. 6800, Sec. 180005), if passed, would also allow states to expand the CVV to $35 for all participants through September 30, 2020.
- **Addressing Infant Formula and Other WIC Food Package Shortages:** Considerable media attention has been paid to stocking shortages of staple grocery items, particularly at the start of the pandemic. In anecdotal reports, WIC participants have reported challenges finding approved infant formula amid store shortages and stockpiling.[54] When this is the case, state agencies, who negotiate infant formula contracts on an agency-by-agency basis, should seek commercial infant formula substitutions and continue discouraging participants from making their own formula at home, which may not meet the nutritional needs of infants.[55] For example, in states where specific brands of formula are only available to WIC participants in powdered form, agencies can request substitutions that allow WIC participants to obtain the same formula in a ready-to-use liquid form. Agencies may also work with infant formula manufacturers to facilitate direct distribution to WIC clinics and participants. To help address infant formula and other WIC Food Package shortages, Congress could support expanded communication, outreach, technical assistance, and capacity building regarding existing waiver flexibilities, including webinars and resources highlighting best practices for WIC food package substitutions. Confusion around implementation of approved WIC package flexibilies can dampen their impact; therefore, enhanced communication is important for WIC providers, retailers, and shoppers.

Strengthening WIC in the Aftermath of COVID-19

Although the disruptions brought by COVID-19 to WIC and other federal nutrition assistance programs present enormous challenges, the flurry of activities to modify WIC delivery systems present opportunities to strengthen and optimize program operations moving forward. Prior to COVID-19, WIC faced several challenges in retaining eligible participants beyond infancy. That is, in 2017, WIC served 79 percent of all eligible infants, but only 42 percent of eligible children aged 1-4 years old.[56] Another challenge is ensuring WIC participants redeem their full benefit packages, given only 9.5 percent to 16.4 percent of participants redeem or purchase all of the food issued to them in the WIC-prescribed amount.[57] Current changes to optimize WIC and increase the flexibility of how benefits are administered may also help to improve WIC retention and benefits redemption post-COVID-19. These changes and future flexibilities to administering WIC during COVID-19 are necessary to guarantee equitable access for clients, sufficient support for staff, and the integrity of evidence-based approaches that are the backbone of WIC. Rigorous evaluation of policy and practice modifications is essential for documenting ongoing program effectiveness. Table 3 identifies and describes evaluation opportunities with the greatest likelihood to shape WIC policy and practice after COVID-19. These findings may support evidence-based efforts to enhance WIC during the upcoming Child Nutrition Reauthorization process.

Table 3.

Key COVID-19 WIC Provisions to Evaluate in Order to Optimize Program Impact

Modernizing WIC Enrollment During this pandemic, remote enrollment and recertification have been implemented to support social distancing efforts. Thoughtful evaluation has the potential to demonstrate whether these simplified practices could help improve sustained program participation, reduce churn (the temporary loss of benefits by a household that must later reapply for services), and decrease administrative costs and burden.[58,59]
Streamlining WIC Enrollment Participation in multiple safety net programs, simultaneously, has synergistic benefits on health.[24] As more individuals become eligible for WIC and other safety net programs during the COVID-19 recovery, technology may help states to enroll participants in multiple safety net programs more efficiently (e.g., single applications for SNAP, Medicaid, and WIC).
Extending Eligibility It is unknown whether extending the length of eligibility for an additional year for mothers (i.e., from one year to two years postpartum) and children (i.e., from five years to six years—when the child is not yet enrolled in kindergarten) could increase the positive impacts of WIC on health and well-being.
Enhancing and Expanding Outreach Enhancing and expanding WIC outreach is likely necessary as households who have little to no experience navigating the federal nutrition safety net become WIC-eligible due to economic hardships. Evaluation may be helpful in understanding and quickly scaling up best practices to promote enrollment during this pandemic and the resulting economic recovery. New and innovative methods of WIC promotion may help improve enrollment rates, which have been historically low (i.e., in 2017, 51.1% of eligible participants enrolled in WIC[56]). Expanded WIC participation could potentially help lower our nation's maternal mortality rates, which have been significantly increasing over the last three decades.[60]
Examining WIC Food Package Flexibilities Both quantitative and qualitative research assessing how state WIC agencies and WIC-authorized stores have responded to COVID-19 food shortages and the role of WIC program flexibilities and contingencies is important to identifying successful implementation strategies in the program and retail spaces. This work should also include an examination of how participants responded, such as an uptick in online discussions of homemade infant formulas, which pose serious nutritional imbalance and food safety risks to infants.[55] Several food supply challenges are not unique to this pandemic and often occur during natural disasters, such as in both Puerto Rico and the US Virgin Islands during Hurricane Maria.[61]
Scaling Up Nationwide Best Practices Future research is needed to assess state differences in the use of COVID-19 WIC waivers and how these relate to their varying vendor and point-of-purchase labeling requirements and, in the long term, WIC participants' dietary intake, weight status, and health.
Evaluating Changes in Breastfeeding The World Health Organization[62] reported that the COVID-19 virus has not, to date, been detected in breastmilk of any mother with confirmed or suspected COVID-19 and believes that transmission through breastmilk is unlikely. However, uncertainty about transmission may impact whether a mother with COVID-19 chooses or is able to breastfeed (particularly a frontline worker). Simultaneously, hesitance to shop for formula in person or challenges accessing formula due to COVID-19-related shortages may increase breastfeeding practice among women who are able to breastfeed. Understanding COVID-19-related changes in breastfeeding practice and the motivations behind them will be important as these may influence subsequent changes in program retention.

Conclusions

WIC is effective for improving nutrition and health outcomes among women and young children. Demand for WIC has and will increase due to COVID-19 and resulting impacts on the economy. The federal government has taken some important steps to increase WIC flexibility and support increased enrollment, but more efforts are needed—both to ensure funding for WIC activities and to protect participants and staff. Rigorous evaluations of the current and proposed changes to WIC will be essential to document impact and to support evidence-based policy recommendations to strengthen WIC going forward, especially as many COVID-19-related flexibilities have strong potential to improve WIC's health impact and increase retention and redemption if integrated into post-COVID-19 policy.

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References

1. United States Department of Agriculture. 2013. "About WIC." Accessed April 23, 2020. https://www.fns.usda.gov/wic/about-wic
2. United States Department of Agriculture. 2019. "WIC Eligibility Requirements." Accessed April 23, 2020. https://www.fns.usda.gov/wic/wic-eligibility-requirements
3. Carlson, Steven, and Zöe Neuberger. 2017. "WIC Works: Addressing the Nutrition and Health Needs of Low-Income Families for 40 Years." *Center on Budget and Policy Priorities*. Accessed April 23, 2020. https://www.cbpp.org/research/food-assistance/wic-works-addressing-the-nutrition-and-health-needs-of-low-income-families
4. Colman, Silvie, Ira P. Nichols-Barrer, Julie E. Redline, et al. 2012."Effects of the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC): A Review of Recent Research." Alexandria, VA: United States Department of Agriculture.
5. United States Department of Agriculture. 2020. "WIC Data Tables." Accessed April 23. https://www.fns.usda.gov/pd/wic-program
6. United States Department of Agriculture. 2013. "WIC Food Packages - Maximum Monthly Allowances." Accessed April 23, 2020. https://www.fns.usda.gov/wic/wic-food-packages-maximum-monthly-allowances
7. Department of Labor. 2020. "Unemployment Insurance Weekly Claims." Accessed April 23. https://www.dol.gov/ui/data.pdf
8. Aarson, Stephanie, and Francisca Alba. 2020. "The Unemployment Impacts of COVID-19: Lessons Learned From the Great Recession." *The Brookings Institution*. Accessed May 5. https://www.brookings.edu/blog/up-front/2020/04/15/the-unemployment-impacts-of-covid-19-lessons-from-the-great-recession/
9. Hanson, Kenneth, and Victor Oliveira. 2012. "How Economic Conditions Affect Participation in USDA Nutrition Assistance Programs." *USDA-ERS Economic Information Bulletin*: 100.
10. Bauer, Lauren. 2020. "The COVID-19 Crisis Has Already Left Too Many Children Hungry in America. *Brookings Institute*. Accessed May 26. https://www.brookings.edu/blog/up-front/2020/05/06/the-covid-19-crisis-has-already-left-too-many-children-hungry-in-america/
11. Feeding America. 2020. "The Impact of Coronavirus on Food Insecurity." Accessed April 23, 2020. https://hungerandhealth.feedingamerica.org/wp-content/uploads/2020/03/Brief_Covid-and-Food-Insecurity-3.30.pdf
12. "Special Supplemental Nutrition Program for Women, Infants and Children (WIC): Revisions in the WIC Food Packages; Final Rule." 2014. 79 Federal Register 42. 12274-12300.
13. Nianogo, Roch A., May C. Wang, Ricardo Basurto-Davila, et al. 2019. "Economic Evaluation of California Prenatal Participation in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) to Prevent Preterm Birth." *Preventive Medicine* 124:42-49.
14. Sonchak, Lyudmyla. 2016. "The Impact of WIC on Birth Outcomes: New Evidence from South Carolina." *Maternal and Child Health Journal* 20(7):1518-1525.
15. Hoynes, Hilary, Marianne Page, and Ann Huff Stevens. 2011. "Can Targeted Transfers Improve Birth Outcomes?: Evidence From the Introduction of the WIC Program." *Journal of Public Economics* 95(7-8):813-827.
16. Joyce, Ted, Andrew Racine, and Cristina Yunzal-Butler. 2008. "Reassessing the WIC Effect: Evidence From the Pregnancy Nutrition Surveillance System. *Journal of Policy Analysis and Management* 27(2):277-303.
17. Bitler, Marianne P., and Janet Currie. 2005. "Does WIC Work? The Effects of WIC on Pregnancy and Birth Outcomes. *Journal of Policy Analysis and Management* 24(1):73-91.
18. Bitler, Marianne P., and Janet Currie. 2005. "The Changing Association Between Prenatal Participation in WIC and Birth Outcomes in New York City: What Does it Mean? *Journal of Policy Analysis and Management* 24(4):687-690.
19. Lazariu-Bauer, Victoria, Howard Stratton, Robert Pruzek, et al. 2004. "A Comparative Analysis of Effects of Early Versus Late Prenatal WIC Participation on Birth Weight: NYS, 1995. *Maternal and Child Health Journal* 8(2):77-86.
20. Fingar, Kathryn R., Sibylle H. Lob, Melanie S. Dove, et al. 2017. "Reassessing the Association Between WIC and Birth Outcomes Using a Fetuses-at-Risk Approach." *Maternal and Child Health Journal* 21(4):825-835.
21. Soneji, Samir, and Hiram Beltran-Sanchez H. 2019. "Association of Special Supplemental Nutrition Program for Women, Infants, and Children With Preterm Birth and Infant Mortality. *JAMA Network Open* 2(12):e1916722.
22. Angley, Meghan, Vanessa R. Thorsten, Carolyn Drews-Botsch, et al. 2018. "Association of Participation in a Supplemental Nutrition Program With Stillbirth by Race, Ethnicity, and Maternal Characteristics." *BMC Pregnancy Childbirth* 18(1):306.
23. Jun, Shinyoung, Diane J. Catellier, Alison L. Eldridge, et al. 2018. "Usual Nutrient Intakes from the Diets of US Children by WIC Participation and Income: Findings From the Feeding Infants and Toddlers Study (FITS) 2016." *Journal of Nutrition* 148(9s):1567s-1574s.
24. Lee, Bong J., and Lucy Mackey-Bilaver. 2007. "Effects of WIC and Food Stamp Program Participation on Child Outcomes." *Children and Youth Services Review* 29(4):501-517.
25. Schneider, Julie M., Mary L. Fujii, Catherine L. Lamp, et al. 2008."The Use of Multiple Logistic Regression to Identify Risk Factors Associated With Anemia and Iron Deficiency in a Convenience sAmple of 12-36-mo-old Children From Low-income Families." *American Journal of Clinical Nutrition* 87(3):614-620.
26. Currie, Janet. 2009. "Policy Interventions to Address Child Health Disparities: Moving Beyond Health Insurance." *Pediatrics* 124 Suppl 3:S246-254.
27. Jackson, Margot I. 2015."Early Childhood WIC Participation, Cognitive Development and Academic Achievement." *Social Science & Medicine* 126:145-153.
28. Buescher, Paul A., Stephanie J. Horton, Barbara L. Devaney, et al. 2003. "Child Participation in WIC: Medicaid Costs and Use of Health Care Services." *American Journal of Public Health* 93(1):145-150.
29. Thomas, Tracy N., Maureen S. Kolasa, Fan Zhang, et al. 2014. "Assessing Immunization Interventions in the Women, Infants, and Children (WIC) Program. *American Journal of Preventive Medicine* 47(5):624-628.
30. Bersak, Tim, and Lyudmyla Sonchak. 2018. "The Impact of WIC on Infant Immunizations and Health Care Utilization." *Health Services Research* 53 Suppl 1:2952-2969.
31. Lee, Jessica Y., R. Gary Rozier, Edward C. Norton, et al. 2004. "Effects of WIC Participation on Children's Use of Oral Health Services. *American Journal of Public Health* 94(5):772-777.

32. Andreyeva, Tatiana, Joerg Luedicke, Ann E. Middleton, et al. 2012. "Positive Influence of the Revised Special Supplemental Nutrition Program for Women, Infants, and Children Food Packages on Access to Healthy Foods. *Journal of the Academy of Nutrition and Dietetics* 112(6):850-858.

33. Schultz, Daniel J, Carmen B. Shanks, and Bailey Houghtaling. 2015. "The Impact of the 2009 Special Supplemental Nutrition Program for Women, Infants, and Children Food Package Revisions on Participants: A Systematic Review. *Journal of the Academy of Nutrition and Dietetics* 115(11):1832-1846.

34. Ng, Shu W., Bridget A. Hollingsworth, Emily A. Busey, et al. 2018. "Federal Nutrition Program Revisions Impact Low-income Households' Food Purchases." *American Journal of Preventive Medicine* 54(3):403-412.

35. Hamner, Heather C., Courtney Paolicelli, Kellie O. Casavale, et al. 2019. "Food and Beverage Intake From 12 to 23 Months by WIC Status." *Pediatrics* 143(3).

36. Tester, June M., Cindy W. Leung, and Patricia B. Crawford. 2016. "Revised WIC Food Package and Children's Diet Quality." *Pediatrics* 137(5).

37. Chiasson, Mary A., Sally Findley, J.P. Sekhobo, et al. 2013. "Changing WIC Changes What Children Eat." *Obesity* 21(7):1423-1429.

38. Ishdorj, Ariun, and Oral Capps, Jr. 2013. "The Effect of Revised WIC Food Packages on Native American Children." *American Journal of Agricultural Economics* 95(5):1266-1272.

39. Whaley, Shannon E., Lorrene D. Ritchie, Phil Spector, et al. 2012. "Revised WIC Food Package Improves Diets of WIC Families." *Journal of Nutrition Education and Behavior* 44(3):204-209.

40. Daepp, Madeleine I.G., Steven L. Gortmaker, Y. Claire Wang, et al. 2019. "WIC Food Package Changes: Trends in Childhood Obesity Prevalence." *Pediatrics* 143(5).

41. Chaparro, M. Pia, Christopher E. Anderson, Catherine M. Crespi, et al. 2020. "The New Child Food Package is Associated With Reduced Obesity Risk Among Formula Fed Infants Participating in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) in Los Angeles County, California, 2003-2016." *International Journal of Behavioral Nutrition and Physical Activity* 17(1):18.

42. Li, Kelin, Ming Wen, Megan Reynolds, et al. 2019. "WIC Participation and Breastfeeding after the 2009 WIC Revision: A Propensity Score Approach." *International Journal of Environmental Research and Public Health* 16(15).

43. Langellier, Brent A., M. Pia Chaparro, May C. Wang, et al. 2014. "The New Food Package and Breastfeeding Outcomes Among Women, Infants, and Children Participants in Los Angeles County." *American Journal of Public Health* 104 Suppl 1(Suppl 1):S112-118.

44. French, Valerie. American College of Obstetricians and Gynecologists. 2020. "Coronavirus (COVID-19) and Women's Health Care: A Message for Patients." Accessed April 23. https://www.acog.org/patient-resources/faqs/womens-health/coronavirus-and-womens-health-care

45. American Academy of Pediatrics. 2020. "COVID-19." Accessed April 23. http://aapca2.org/covid19/

46. Food and Agriculture Organization of the United Nations. 2020. "Novel Coronavirus (COVID-19)." Accessed April 23. http://www.fao.org/2019-ncov/q-and-a/impact-on-food-and-agriculture/en/

47. Good, Keith. 2020. "Prices for Some Food Staples Increase, as COVID-19 Impacts on Labor Remain a Concern." *University of Illinois Cooperative Extension. Farm Policy News.* Accessed May 26. https://farmpolicynews.illinois.edu/2020/04/prices-for-some-food-staples-increase-as-covid-19-impacts-on-labor-remain-a-concern/

48. United States Department of Agriculture. 2020. "WIC: COVID-19 Waivers by State." Accessed April 23. https://www.fns.usda.gov/disaster/pandemic/covid-19/wic-waivers-flexibilities

49. United States Department of Agriculture. 2019. "USDA WIC Telehealth Innovations Project." Accessed April 23, 2020. https://www.fns.usda.gov/wic/usda-wic-telehealth-innovations-project

50. United States Department of Agriculture. 2020. "FNS Launches the Online Purchasing Pilot." Accessed April 23. https://www.fns.usda.gov/snap/online-purchasing-pilot

51. Harris, Jennifer L., and Jennifer L. Pomeranz. 2020. "Infant Formula and Toddler Milk Marketing: Opportunities to Address Harmful Practices and Improve Young Children's Diets." *Nutrition Reviews.* Accessed July 8. doi:org/10.1093/nutrit/nuz095

52. Jilcott Pitts, Stephanie B., Shu Wen Ng, Jonathan L. Blitstein, et al. 2018. "Online Grocery Shopping: Promise and Pitfalls for Healthier Food and Beverage Purchases." *Public Health Nutrition* 21(18):3360-3376.

53. National WIC Association. 2020. "COVID-19 Resources." Accessed April 23. https://www.nwica.org/covid-19-resources

54. Guynn, Jessica. 2020. "Baby Formula Shortages Easing After Coronavirus Panic Buying, But Don't Expect Fully Stocked Shelves for Months." *USA Today*. Accessed July 8. https://www.usatoday.com/story/money/2020/04/17/coronavirus-shopping-baby-formula-infant-formula-shortage-covid-19/5139317002/

55. Davis, Sutton A., Linda L. Knol, Kristi M. Crowe-White, et al. 2020. "Homemade Infant Formula Recipes May Contain Harmful Ingredients: A Quantitative Content Analysis of Blogs." *Public Health Nutrition* 1-6.

56. Gray K, Trippe C, Tadler C, Perry C, Johnson P, Betson D. *National- and State-Level Estimates of WIC Eligibility and WIC Program Reach in 2017 Final Report*. Alexandria, VA: USDA Food and Nutrition Service;2019.

57. Phillips, Diane, Loren Bel, Ruth Morgan, et al. 2014. "Transition to EBT in WIC: Review of Impact and Examination of Participant Redemption Patterns: Final Report. Altarum Institute.

58. Food Research & Action Center. 2020. "Maximizing WIC's Role in Supporting Health, Food Security, and Safety During the COVID-19 Pandemic: Opportunities for Action." Accessed May 5. https://frac.org/wp-content/uploads/wic-role-during-covid-19-pandemic.pdf

59. Nueberger, Zöe. 2020. "Streamlining and Modernizing WIC Enrollment With Current Rules and Funding, WIC Agencies Can Simplify Certification Practices to Reach More Eligible Families." *Center on Budget and Policy Priorities*. Accessed May 5. https://www.cbpp.org/research/food-assistance/streamlining-and-modernizing-wic-enrollment

60. Hoyert, Donna L., and Arialdi M. Minino. 2020. "Maternal Mortality in the United States: Changes in Coding, Publication, and Data Release, 2018" *National Vital Statistics* 69(2).

61. USDA Food and Nutrition Service. 2017. "Food Assistance Heading to Hurricane Hit Puerto Rico and U.S. Virgin Island Households [press release]." Washington, DC. Accessed July 8, 2020. https://www.fns.usda.gov/pressrelease/2017/012617

62. World Health Organization. 2020. "Frequently Asked Questions: Breastfeeding and COVID-19 For Health Care Workers." Accessed May 5. https://www.who.int/docs/default-source/maternal-health/faqs-breastfeeding-and-covid-19.pdf?sfvrsn=d839e6c0_1

About Healthy Eating Research

Healthy Eating Research (HER) is a national program of the Robert Wood Johnson Foundation. Technical assistance and direction are provided by Duke University under the direction of Mary Story PhD, RD, program director, and Megan Lott, MPH, RDN, deputy director. HER supports research to identify, analyze, and evaluate environmental and policy strategies that can promote healthy eating among children and prevent childhood obesity. Special emphasis is given to research projects that benefit children and adolescents and their families, especially among lower-income and racial and ethnic minority population groups that are at highest risk for poor health and well-being and nutrition related health disparities. For more information, visit ***www.healthyeatingresearch.org*** or follow HER on Twitter at ***@HEResearch***.

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