Effects on Benefit Redemption When 2% Milk is Issued After WIC Participants Refuse 1% or Fat Free Milk

by

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ABSTRACT

Background: The Special Supplemental Nutrition Program for Women, Infant and Children (WIC) provides participants with a supplemental food package that follows the Dietary Guidelines for Americans (DGA's). The WIC food package has been shown to improve the diet quality and overall health status of WIC participants. Since the 2009 WIC food package revision, standard issuance of 1% or fat-free milk has been practiced for participants 24 months or older. Improving the value that participants have on the WIC foods can be an effective method to improve redemption of WIC foods and improve overall participation. The aim of this study was to examine if allowing issuance of 2% milk when clients refuse issuance of 1% or skim milk would affect benefit redemption of milk and other WIC foods. The study also examined how providing clarification through training on policy change for issuance of 2% milk would improve staff and director knowledge of this change in policy.

Methods: This study was an observational, longitudinal study that used linear regression analysis of aggregated data at the local agency-level from the Arizona WIC program. Redemption data were analyzed using the Arizona WIC Health and Nutrition Delivery System (HANDS) at three different intervals throughout the study. The three months prior to the policy introduction (March-May 2020), redemption after policy introduction (July-September 2020), and redemption after policy clarification with 2% milk policy trainings (December 2020-February 2021). Redemption was measured as benefits issued versus benefits redeemed. Two separate surveys were delivered (via Qualtrics) to the 18 local agency directors (n=18) and their staff members (n=287). These surveys were used for descriptive purposes.

Results: The results of this study found that there was a decrease in redemption of 2% milk and all foods at the post intervention stage of the study. WIC staff were found to have a better understanding of policy to issue 2% milk. Conclusion: Although these findings are consistent with other current research, further research is needed to examine how changing policy on current food restrictions placed on WIC foods affects redemption and how this may improve overall participation.

DEDICATION

This study is dedicated to the extraordinary individuals that spend their days serving our families as WIC staff, directors, IBCLCs, RDNs, state staff, and in any capacity at the local or state level. You each make WIC the amazing program that it is. Thank you for all that you do!

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CHAPTER 1

INTRODUCTION

Overview

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides food and nutritional assistance to at-risk populations such as pregnant and lactating women and to children under 5 years of age.[1-3] Since it's initiation in 1974, WIC has had a positive impact on the health outcomes and nutrition status of the families it serves.[1, 2] When families of children that experienced food insecurity with and without hunger had an additional WIC visit this reduced household food insecurity.[4] WIC also plays an important role in the quality of diets for its participants.[5-7] The program delivers participant education that empowers families to make better foods choices, along with the healthy food options that are offered in the WIC food package.[1] Participants that stayed on the program for the first full two years were found to have better quality diets as compared to those participants who no longer continued with participation in the program.[5] These studies support that food programs that serve low-income families such as WIC, serve an important role in reducing and eliminating food insecurity and improving diet quality for these families.

WIC offers a food package that follows the USDA Dietary Guidelines for Americans which provides essential nutrients.[1, 8-10] Participants were found to have greater than 40% of the calories and greater than 50% of nutrients (vitamins, minerals and Fiber) of the overall diet from WIC foods.[11] This demonstrates the nutritive impact that WIC has on its participants with the quality of foods that are offered by the program,

and furthermore, the importance for participants to remain on the program long term when they are eligible.

With higher quality diets, children that participate in the WIC program have improved health outcomes and better dietary practices that can be seen long term.[12] WIC empowers parents to teach children healthy eating practices through healthy choices in family meals.[1] This is evident with a study that found children ages two to five years of age participating in the WIC program had better intake of fat, carbohydrates, protein, added sugars and had overall lower snacking as compared to children not participating in WIC.[12] From birth to age five, infants and children participating in the WIC program were found to have increased breastfeeding initiation, daily fruit and vegetable intake, whole grain intake, switches from whole milk to lower fat milk and decreased instances of BMI greater than the 95th percentile.[13] Current evidence supports that the WIC program helps reduce cases of food insecurity among households, and has a positive impact that the food package and education offered by the program has on the participant diet quality and eventual health outcomes.

Although we have strong research that supports the benefits of participating in the WIC program, there continues to be a decline in participation.[8, 14] Participation in 2019 declined to nearly 6.4 million from nearly 9.2 million in 2010.[2, 15] Studies indicated that possible causes that lead individuals to stop participating in the WIC program include experiences and perception with the shopping experience, participant satisfaction with the WIC food package and program implementation.[16, 17] Strict limitations on certain foods have also been considered as a contributor to the decline in participation.[8] This is an area

of research that needs further exploration to better understand the real causes of this observed declined in WIC participation.

The WIC program has made changes in past years to improve participant experience at the grocery store when shopping for WIC foods. These changes include a final rule requiring state WIC programs to replace paper checks with an EBT card by October 1, 2020.[18] Some states, such as the Arizona State WIC program, have the availability of a WIC smartphone application that can help clients determine eligible WIC foods.[3] Despite these improvements, Weber et al 2019, found that, participants reported a perceived stigma, issues with program administration, food packaging, store experience and the overall system.[16] When it comes to the food package, participants indicated more value from the infant food package as compared to the children and women's food packages. Some reported not seeing a benefit in continuing in the program once children ate regular, table food.[16] This particular finding requires a closer look on how the food package affects satisfaction and desire for continued participation.

Milk issuance may be a reason why parents un-enroll in WIC. Milk as a form of dairy is important component of the DGAs[19] and is a benefit offered by the WIC food package[1, 3]. Restrictions on milk choice offered by WIC have been associated with the reduced value participants place on the food package.[20] Current food package guidelines follow recommendations for reduced fat for children over the age of two and for woman categories[1]. Milk options may be a way to meet participant preferences and improve value for the WIC food package. When it comes to milk preference it was found that parents had incorrect knowledge of nutrient content of milk and the biggest factor in milk choice was parents who never tried low fat milk.[21] Although this could be a significant

point for education, it should not discourage staff to meet participant preferences. Even with reduced fat milk, a higher daily energy intake can be achieved if children have an overall higher intake of milk.[13]

Milk intake plays an important role in a balanced diet. Milk is widely available and is a great source of vitamin D and calcium.[22, 23] Consumption of whole milk was associated with higher Vitamin D stores and lower BMI.[14] Black et al, 2002 found that children who had long term milk avoidance were found to have lower calcium intake, smaller stature and lower total bone and muscle density.[15] This evidence supports that when intake of higher fat milk is within recommendations, the benefits can outweigh the risk of health concerns due to the absence of milk in the diet. If WIC issues milk that is not aligned with the client's preferences, it is a missed opportunity to maintain client satisfaction and promote the intake of milk.

Despite the health and food benefits offered by WIC, participation and retention has declined over time[1]. One of the many challenges to WIC participation may be the limitations and specific variety of foods offered (milk, eggs, juice, cheese, whole wheat grains, fruits, and vegetables) which may lead to a decrease in redemption of benefits and participation in the program. Current research has focused on the health and nutrition benefits of the 2009 WIC food package revisions, but there is limited research that focuses on the effects of these revisions on redemption of benefits and participation. Further research is needed to improve WIC participation by looking at ways to increase redemption as a viable way to improve participation. Participant dissatisfaction and negative shopping experience are factors that lead participants to unenroll from the WIC

Program.[8, 24] Targeting client satisfaction with the WIC food package can serve as a strategy to improve both redemption and participation.

Purpose of Study

The purpose of this study is two-fold:

1. To examine if providing WIC staff with more information on 2% milk issuance policies is related to their knowledge on milk issuance at WIC
2. If this change in milk issuance policy is related to redemption of food benefits (milk, cheese, yogurt, fruits, vegetables, legumes, whole grains, cereals, eggs, fruits, and vegetables) among WIC participants.

We hypothesize that staff knowledge of issuing 2% milk when clients refuse 1% or fat free milk will improve, causing a primary effect of improved redemption of 2% milk issued, and have a secondary effect of improved redemptions of other food subcategories and program participation for the months observed in this study.

Definitions of Terms

Adjunct Eligible: Participating in one or more of the following programs: Supplemental Nutrition Assistance Program (SNAP), Medicaid, Section 8 Housing program and, or the Temporary Assistance for Needy Families (TANF).
Income Eligible: Eligible based on a household income that is at or below 185% of the federal poverty guideline.
Client: Person participating in the WIC program.
Childhood obesity: BMI that is greater than the 95%ile.
BMI: the Body Mass Index is calculated by dividing one's body mass by the square of body height.
DGA's: Dietary Guideline for Americans provides advise on what to eat and drink to meet nutrient needs.
Food Benefits: Any WIC foods (milk, yogurt, cheese, whole grains, legumes, cereals, juice, fruits and vegetables) issued to Participants.

Food insecurity: limited or unreliable access to food.
Higher-fat milk: 2% or whole milk.
Lower-fat milk: 1% or fat-free/skim milk.
Participant: Person participating in the WIC program.
Participation: Number of participants/clients enrolled in the WIC program.
Postpartum woman: woman who is not offer breast milk to an infant age 0-6 months of age.
EN woman: Lactating woman who is entirely nursing an infant age 0-12 months.
PN woman: Lactating woman who is mostly nursing an infant age 0-12 months.
PN+ woman: Lactating woman who is mostly formula feeding but partially nursing an infant age 0-12 months.
Lactating woman: postpartum woman that is offering any breast milk to an infant age 0-12 months.
Redemption: the number of food benefits issued that were redeemed.
USDA: The United States Department of Agriculture is the federal executive department under which WIC and other food and nutrition programs are funded.
WIC: The Women, Infant and Children Supplemental Nutrition Program is a federal assistance program that provides nutrition and healthcare referrals to pregnant, postpartum, lactating women, infants, and children under the age of five.
HANDS: The Health and Nutrition Delivery System is the electronic record system used by the Arizona WIC program
ADHS: The Arizona Department of Health Services administers the WIC program in Arizona
Local Agency: County Health Department, Community Health Center, or Federally Qualified Health Center that offer the WIC services to participants.
Staff member: WIC personal that provides WIC services to participants
Local Agency Director: Director that oversees the WIC program housed at the local agency.
State WIC Director: Director at ADHS that oversees the WIC program for the entire state of Arizona.

CHAPTER 2

REVIEW OF LITERATURE

Milk Consumption

Milk intake plays a role in a balanced diet. Milk is a major source of potassium, vitamin D and calcium and readily available.[19, 25] More than half of the dietary calcium in the United States is obtained through milk and milk products.[26] Milk is included in the 2020 Dietary Guidelines for Americans as part of dairy, with daily recommended amounts of 1.5-2 cup equivalents for children 12-23 months, 2-2.5 cup equivalents Children 2-8 years of age, and 3 cup equivalents for adults 19-59 years of age[19]. Intake of milk has been found to reduce risk of childhood obesity, improve body composition in adults, and improve bone density.[27] There is also evidence that suggests that dairy products, such as milk, play a key part in reducing the risk of heart disease, hypertension, obesity, and Type 2 Diabetes[27-29] that disproportionately impact people of color.[28] Higher fat milk was also found to have a protective factor against severe obesity in preschool-aged Latino children.[30] Consumption of whole milk was associated with higher vitamin D stores and lower BMI.[31] Maternal milk and vitamin D intake were significant predictors of birth weight, with each additional cup of milk being associated with a 41 gram increase in birth weight.[32] The important nutrients found in milk contribute to better health outcomes when daily recommendations are met.

Current research has also explored the health concerns related to excessive intake of milk which includes anemia and constipation in toddlers and preschoolers and the association with some cancers in adulthood.[33] The DGA's recommend a higher selection of low-fat or fat free milk to reduce dietary intake of saturated fats.[19] However, when

limitations are placed on milk type available for purchase, it can lead participants to elect not to incorporate milk frequently or entirely as part of their daily balance diet which can contribute to negative health outcomes. This phenomenon was observed by Mannion et al in pregnant women who consumed less than 250 ml/day of milk, had infants with lower weights than those that consumed more milk per day.[32] Ishdorj and Capps observed that after the 2009 WIC Food Package revisions, which are described in more detail later in the this document, there was a significant decrease in desirable nutrients received through milk with a decrease in protein (10%), calcium (9.7%), potassium (9.1%), and vitamin D (7.8%).[34]

Current studies that have compared higher fat milk to low fat milk have found that a higher daily energy intake can be achieved if there is an overall higher consumption of low fat milk.[13] The Milky Way study followed 49 children and found that dietary energy levels remained the similar, and there were no significant differences in adiposity or cardiometabolic risk among children who consumed either low-fat or whole-fat milk.[35] Black et al, 2002 found that children who had long term milk avoidance had lower calcium intake, smaller stature and lower total bone and body density.[36] Current evidence supports that intake of milk is beneficial for all ages, especially for children who are in a critical period of bone mass growth.[29] When intake of whole milk is within recommendations, the benefits can outweigh the risk of health concerns. When dairy, such as milk, is not consumed in sufficient amounts, it is difficult to meet nutrient needs.[37] It was found that 60% of Americans 2 years and older who were not meeting daily recommendations of dairy, were consuming calcium and magnesium below the Estimate Average Requirement (EAR). [37] When children and adults meet daily dairy

recommendations, they are more likely to meet EAR for calcium, magnesium, phosphorus, riboflavin, vitamin A, vitamin B12, and zinc.[37] African Americans in all age groups have been found to have a lower intake of dairy, including milk, than none-African Americans and had a lower intake of calcium, magnesium and phosphorus.[38] Improving intake of dairy foods such as milk, can be an effective way of improving adequate intake of certain vitamins and minerals.[22]

Predictors of Milk Intake

Past studies on predictors of milk intake have focused on school-aged children (ages 5-17).[39] Findings in these studies show that predictors of milk intake included maternal milk intake (both type and amount), sex, race/ethnicity, and neighborhood.[39, 40] For example, Panely et al. found that the strongest predictor of milk intake for a child was their mother's milk intake: for every 0.64 grams of milk consumed by a mother, their child's milk intake increased by 0.1 gram.[39] Another study looked at differences in beverage intake across age, sex, race and ethnicity and found that compared to African Americans, white and Mexican Americans of all ages had higher milk intake.[40] A 2015 study specifically looked at 8,959 stores and found that only half carried 1% milk and over two thirds carried 2% milk.[41] Rimkus et al. also found that low fat milk was 32% to 44% less available in low income communities as compared to high income communities.[41] Furthermore, any type of milk carried by stores was 31 to 67% less available in majority black and 26% to 45% less available in other mixed race communities as compared to predominantly White communities.[41] Milk preference was found to be a result of some parents having incorrect knowledge of the nutrient content of milk and the biggest factor in milk choice was parents who never tried low fat milk.[21] It

can be seen that while some predictors of milk consumption are participant demographics and maternal milk consumption, this can also be influenced by socio-economic status and access to milk type within a lower income, racial/ethnic minority community.

Taste, dietary preferences, and medical conditions such as lactose intolerance also contribute to overall consumption of milk. One area of research has looked at preference for flavored milk in children ages 2-18, with findings suggesting that intake of either flavored or plain milk has positive a positive impact on nutrient intake with no adverse effects on BMI. Milk fat plays an important role in sensory perception for individuals drinking milk, with selection of milk type being based on these sensory characteristics.[42] Hardwood and Drake also found that milk fat content was the main driver for the type of milk consumed.[43] Increased consumption of non-dairy milk alternatives has been related to the consumer's goal to consume less animal products, perceived mistreatment of animals, and perceived reduced impact on the environment when non-dairy milk products are consumed.[44] Lactose intolerance can be a barrier for low dairy intake.[45] In North America, lactose intolerance affects approximately 79% of Native Americans, 75% of Blacks, 51% of Hispanics, and 21% of Caucasians.[46] Other individuals may have reduced dairy intake, including milk, due to perceived lactose intolerance.[47, 48]

Current research on milk intake, benefits and negative health outcomes focuses on age groups that are school age-children and adults. Limited studies are available that focus on level of education and child intake of milk in relation to paternal intake. Nicklas et al. also suggest that more research is needed to identify the barriers for individuals to meet dairy recommendations, including whether food recommendations are practical, feasible and cost-effective.[49] Based on this review of literature, further research and more

current research is needed on milk intake patterns, barriers and consumption based on race, ethnicity and education level.

THE WIC Program

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) is a federal food assistance program that provides supplemental foods, nutrition education, and screening and referrals to health, welfare, and social services to at-risk populations.[1, 10, 50, 51] The program is funded by the United States Department of Agriculture (USDA)'s and administered at the federal level by the Food and Nutrition Service (FNS)[1]. The food packages offered through the program are consistent with the Dietary Guidelines for Americans (DGA)[1, 8, 9, 50]. WIC foods are high in protein, calcium, iron, vitamins A and C to ensure that supplemental food packages help recipients achieve required intakes of short-fall nutrients.[52] Without sufficient intakes of these nutrients, adverse health problems may result.[8] Participants receive personalized one-on-one nutrition education through paraprofessionals[1] and have access to advanced nutrition and lactation education, support, and resources through the program's Registered Dietitians (RDN)[3] and International Board Certified Lactation Consultants (IBCLC).[1, 53] The at-risk population served includes pregnant, lactating, and non-lactating postpartum women, infants, and children under five years of age.[1] To qualify, participants must be found to have a nutrition risk, and must have a household gross income at or below 185% of the federal poverty guideline.[1, 3] Applicants may also qualify as adjunctive eligible if they show proof of participation in one or more of the other assistance programs, which

include the Supplemental Nutrition Assistance Program (SNAP), Medicaid, Section 8 Housing program and, or the Temporary Assistance for Needy Families (TANF).[1, 54]

Since 1974, the WIC program has been utilized by many households, providing services to a quarter of the pregnant woman and over half (54%) of the infant population, and in 2016 was noted to serve approximately 31% of children ages 1-5 years of age in the United Sates.[10] In 2020 there were 6.2 million participants served per month.[55] WIC has the third largest participation of the fifteen nutrition assistance programs administered by USDA.[1] By providing access to nutritious foods, education on healthy eating, and health-related referrals, the program safeguards the health of low income women, infants, and children.[1] This is accomplished through WIC services being provided at 10,000 clinic sites across 50 state health departments, five U.S. territories, the district of Columbia and 34 Indian Tribal organizations.[1] Current research supports that the WIC program reaches many families through providing services, food, and referrals, that impact the nutrition and health status of these families.

2009 WIC Food Package

As a result of the number of individuals it serves, WIC plays an important part in helping a significant portion of the U.S. population meet national nutrition policy goals through the foods and services offered.[10] The supplemental food package provided by the WIC program is consistent with the 2005 DGAs.[9, 50] The National Academy of Medicine, formally the Institute of Medicine (IOM), was tasked in 2014 with reevaluating the food package every 10 years to ensure the it remains consistent with the DGA's.[10] In 2009, the WIC food package was updated to reflect the recommendations of the National

Academy of Medicine, which included increases in the fruits, vegetables, grain, and additional options for dairy benefits.[56] The milk offered in the food package was any type of milk but changed with the revisions to reduced and low fat milk as the standard milk for issuance to participants greater than 23 months of age[1, 8]. These changes aimed at improving the nutrition and health status of participants while meeting their cultural preferences and to better promote and support the successful establishment of long-term breastfeeding.[8, 10, 56] This revision was the most significant change to the food package since the start of the program in 1974, and has been found by many studies over the years to have a positive impact on WIC families.[8] One such study found that after the revisions, WIC families had an increase of 3.9% in the volume of healthy foods purchased.[57] Current evidence supports that with a wider selection of foods, WIC better meets the individual needs, while positively affecting the nutrition choices of each participant.

Current studies demonstrate that the WIC food package and overall program can significantly affect the foods choices of its participants as seen with the 2009 food package revisions. A major effort of the 2009 update was to reduce intake of saturated fat and, cholesterol which resulted in whole milk being removed as a food package option for participants over 23 months of age.[33, 58] After the revision, a decrease in the consumption of whole milk was seen with an increase in low fat milk consumption.[33, 59, 60] Meiqari et al. in particular, found that while children's intake of low fat milk increased, the consumption by the child's mother did not change.[60] Oliveira and Frazão found that when comparing Connecticut WIC that offered low fat milk and Massachusetts WIC which offered reduced fat milk, both states had an overall decrease in milk purchased

even with the use of non-WIC funds.[8] It is important to mention that WIC participant have the option of exchanging milk benefits for soy milk and tofu.[1, 8] It is also pointed out by Oliveira and Frazão that current studies use pre/post data with no control group, which could mean that current findings may reflect results that are not related to changes in WIC policy.[8] Further research is needed to identify what contributes to the decrease in total milk purchased and if it is related to allowable substitutions as in the case of tofu or if this is a result of dissatisfaction with the limitation on milk offered by WIC.

Health Benefits Associated with WIC

The impact that the WIC program has on the food choices of its participants has been demonstrated in many studies.[8, 33, 57, 60] WIC has a long-standing correlation with improved maternal, infant and child health.[1] Improved health outcomes for infants include reduced risk of prematurity, low birth weight, lower Neonatal Intensive Care Unit admissions after birth, and lower infant deaths. [1, 51, 61-63] The revised food package increases the likelihood of appropriate weight for gestational age in infants.[64] In addition to reducing the length of the hospital stay after birth, Bersak and Sonchak found that participation in WIC also increased utilization of healthcare services in the first year of life and immunizations by 0.20 and 0.22 respectively.[65] Infants born to pregnant women receiving the WIC food package had improved length-for-age z-scores at 12 months.[6] Testa and Jackson found that WIC participation reduces the gap in infant healthcare experienced by racial and ethnic minorities.[66]

A need exists to provide resources and healthy foods to continue to improve the diet quality of the many pregnant women to achieve the mentioned improvements in

infant health outcomes. It was found that African American women had diets with a lower Healthy Eating Index 2010 (HEI-2010) score as compared to non-Hispanic white women.[67] The diets of pregnant African American participants were lower in whole grains and in dairy.[67] By improving the diet quality of pregnant participants through the WIC food package, infants can have better developmental outcomes.[5, 6] Women participating in WIC are 1.4-1.5 times more likely to initiate prenatal care in the first trimester.[68] Currie and Rajani found women participating in WIC were more likely to be diagnosed with chronic disease and receive medical services.[63] The reduction in low birth weight in infants was associated with mothers gaining adequate weight during pregnancy.[63] The WIC food package was associated with a risk reduction of 0.6% in maternal preeclampsia and a 3.2% reduction in excessive gestation weight gain.[64] Beyond the efforts to improve the nutritional status of women, WIC also provides referrals to smoking cessation programs and positively impacts rates of cessation for WIC participants.[69]

Children are eligible to receive WIC services until the age of five years, providing an opportunity to positively affect health and nutritional status at a pivotal point in development.[70] WIC screens for anemia, immunizations, and oral health. WIC has a long-standing reputation of reducing the prevalence of anemia in the children population that it serves compared to non-WIC participating children.[71] WIC participating children were found by Lee et al. to be more likely to have dental visits for preventive and restorative services and less likely to have emergency dental services.[72] Additionally, WIC has played a major role in the fight against obesity with Pan et al. finding that in 2016 the obesity prevalence in children ages 2-4 had decreased from 15.9% in 2010 to

13.9% in 2016.[73] In addition to the health benefits, children at 24 months were also found to have improved cognitive scores, further supporting the benefits to infants when mothers are on WIC during pregnancy.[5] These studies support that WIC has an important role in early prevention of future health conditions in children that result from poor oral health, inadequate iron intake, and excessive weight gain in childhood.

Food programs such as WIC, serve an important role in reducing food insecurity among low-income families and improving the health status of WIC participants. Participation in the WIC program was shown to reduce food insecurity by at least 3.6 percentage points.[74] When comparing the HEI-2010 scores of participants from before and after the 2009 revision, it was found that participants had an adjusted average increase of 3.7 HEI points, having an initial HEI score of 52.4 and a 58.3 score after the revision.[75] These scores are measured from 0 to 100, with a range of less than 51 indicating a poor diet, 51 to 80 indicating a diet that needs improvement, and scores greater than 80 indicating a good diet.[76] This is important as it indicates that initial scores were poor and had improved but still fall in a range where the diet needs improvement. It is not enough to create access to food, there needs to be an emphasis on quality foods that improve the nutritional status of participants. WIC accomplishes this by offering a food package that follows the American Dietary Guidelines.

In addition to the directly improved health outcomes of WIC participants, the program also has a secondary impact on non-WIC participants. This is seen through the impact that the WIC food package has on foods available at the store, thus positively affecting the food choices by non-WIC participants.[8]

WIC plays a key role in the quality of diets for its participants. The program delivers participant-centered education that empowers families to make better food choices,[1, 77] along with the healthy food options that are offered in the WIC food package. Participants that stayed on the program for the first full two years were found to have better quality diets as compared to those participants who no longer continued with participation in the program[7]. WIC participants were found to have greater than 40% of the calories and greater than 50% of nutrients (vitamins, minerals and Fiber) of their overall diet from WIC foods[11]. This demonstrates the nutritive impact that WIC has on its participants with the quality of foods that are offered by the program, and furthermore, the importance for participants to remain on the program long-term when they are eligible. Current studies have demonstrated the health benefits and nutritive impact that WIC has on the women, infants and children that are served by the program.

Redemption and Participation

Although there is strong research that supports the benefits of participating in the WIC program, there continues to be a decline in participation[50]. Participation peaked at nearly 9.2 million in 2010 but has been declining to nearly 6.4 million in 2019.[2, 15] Preliminary data indicates that current participation is at nearly 6.25 million for 2021.[2] Studies have explored probable causes that lead individuals to stop participating in the WIC program that included experiences and perceptions of the shopping experience,[24] participant satisfaction with the WIC food package and program implementation.[16, 17] Restrictions on food choices may be a reason for participants exiting the program.[8, 58]

The WIC program has made changes in past years to improve the participant experience at the grocery store when shopping for WIC foods. These changes include replacing paper checks with an EBT card and in some states the availability of a WIC smartphone application that can help clients determine eligible WIC foods.[10] Weber et al. 2019, found that participants reported a perceived stigma related to using WIC services, issues with program administration, food package, store experience and the overall system with room for improvement desired.[16] When it comes to the food package, participants indicated more value placed on the infant food package as compared to the children and women's food packages: some participants reported not seeing the value in continuing the program once their children ate regular table food.[16] This finding requires a closer look at how the food package affects satisfaction and desire for continued participation. It is not known how changes in areas of the food package, such as broadening the allowable types of milk might help to improve program participation and food package redemption.

Milk as part of the WIC Food Package

Milk consumption is low across the U.S. and may be related to poor participation in WIC. Milk issuance may be the reason parents discontinue participation. Restrictions on milk choice (full fat prior to 2009 vs low-fat after 2009) offered by WIC has been associated with reductions in the perceived value of the food package.[16] A review of the WIC food package final report notes that there was a 17% drop in redemption of milk as compared to when 2% milk was previously allowed.[10] Current food package guidelines followed recommendations for reduced fat milk for children over the age of two and for

woman categories[8]. It was noted in the 2016 final report that there were several reasons why the policy on the fat content of milk was not changed; the DGA still held a recommendation for lower fat content milk and the WIC food package is based on the DGA[10], additionally, this recommendation aligned with other food programs that include Child and Adult Care Feeding Program and the National School Nutrition Program[10]. The report does note that if the DGA recommendation should change in the future, the committee will reconsider that requirement for fat free or low-fat milk for women and children.[10]

With updated dietary recommendations, 2% milk substitution may be a way to improve the value placed on the WIC food package while continuing to meet participant dietary needs. When it comes to milk choice, it was found that parents had incorrect knowledge of nutrient content of milk and the biggest factor in milk selection was never trying low fat milk.[12] Although this could be a significant point for education, it should not prevent staff from meeting participant's dietary preferences. An initial study that assessed the satisfaction of the food package revisions at 6 months and 18 months after implementation found that participants reported being unsatisfied with the changes at first but dissatisfaction became less common at 18 months which was attributed to increased acceptance over time.[58] It must be considered that acceptance of a policy change is not equivalent to satisfaction and may merely be a reflection of compliance with a limitation in the food choices. Continuing to issue only 1% or skim milk when a client typically drinks higher fat milk is a missed opportunity to maintain client satisfaction and promote the intake of milk. Further research is needed to examine how issuance of 2% milk when a participant declines standard issuance of 1% or skim milk affects benefit redemption

and participation. Further research is needed to examine changes in redemption of WIC foods if the issuance of higher fat milk is allowed when clients decline low fat options.

Summary

The literature reviewed provides support for the important role that the WIC program plays in health and nutrition status of the families it serves. Although various studies have demonstrated the effectiveness of the WIC program, participation continues to decline.[8, 15] Improving participation in the WIC program is an area of research that requires further exploration. Client satisfaction with the WIC food benefits, specifically milk benefits, could serve as a method to improve value placed on the program. Dairy, including milk, continues to be a key component of the DGAs recommendations: 1.5-2 cup equivalents for children 12-23 months, 2-2.5 cup equivalents for children 2-8 years of age, and 3 cup equivalents for adults 19-59 years of age.[19]

The WIC food package currently offers 1% or fat-free milk as the standard milk issuance to women and children 24 months of age and older.[1, 8, 20] Limiting milk offered in the food package to low fat milk was part of an effort of the 2009 WIC food package revision to reduce intake of cholesterol and saturated fat.[33, 58] While this was an effort in policy to improve health and nutrition, predictors of milk intake have shown that selection of milk type is influenced by mother's milk intake, sex, race/ethnicity and neighborhood,[39, 40] as well as personal preferences based on sensory perception related to the fat content of milk.[42, 43] Maintaining an adequate intake of milk is important as it is a great source of vitamin D, calcium, and potassium.[19, 25] Not consuming sufficient dairy,

including milk makes it difficult to meet daily requirements for important nutrients.[37] Having insufficient intake of milk can have negative consequences on the growth of children. For example, children with milk avoidance had lower calcium intake, smaller stature and lower total bone and body density.[36] Milk offered by the WIC program must meet participant preferences to avoid risk in nutrient deficiency when they refuse 1% or fat-free milk.

The benefits of participants drinking milk offered by the WIC program can be seen through the finding of various studies. Maternal milk intake during pregnancy has a positive impact on birth weight.[32] Higher fat milk intake has been shown to have a protective effect against severe obesity in preschool-aged Latino children.[30] Intake of dairy products, such as milk, has been shown to improve bone density and play a key part in reducing the risk of heart disease, hypertension, obesity, and Type 2 Diabetes.[27-29]

Despite knowledge of the health benefits of milk and WIC benefits including milk, consumption of milk continues to be inadequate.[45] Limitations of foods such as milk, have been found to be possible contributors for reduce redemption and participation of the WIC program.[8, 20] Milk is included as a part of the WIC food package, however, caregivers undervalue the WIC food package.[20] This particular finding speaks volumes to the current decline in participation. It requires a closer look at how the food package affects satisfaction and desire for continued participation. Future research is needed to investigate causes for the continued decline in participation in the WIC program. To the knowledge of the research team this study will be the first of its kind to look at how change in policy to offer 2% milk when clients refuse 1% or fat free milk affects redemption of milk and other food categories and overall participation.

CHAPTER 3

METHODS

Study Design

This study was an observational, longitudinal study that analyzed aggregated data at the local agency-level from the Arizona WIC program and examined if allowing 2% milk when the client refused 1% or skim milk, affects redemption rates. The study design also examined the secondary question, does allowing 2% milk as an option affect redemption of other food benefits? The target population included postpartum, pregnant women, and lactating women as well as children in the 2-year-old, 3-year-old, and 4-year-old categories. The study excluded data from the infant category and one-year old category as these two groups are not eligible for 2% milk secondary to the risk of nutritional deficiency. Moreover, since children in foster families often relocate to other families frequently, the Arizona HANDS system is not able to track down redemptions of these families. Thus, data from children in foster families were excluded from demographics and redemption data.

The WIC directors from the 19 local agencies in Arizona received guidance, with no in-depth training, that the policy for issuance milk type in the child (2year-4 years of age) and all women (Pregnant, Postpartum and Nursing) categories were updated so that 2% milk could be issued when the nutrition assessment determined that participant was at risk for nutritional deficiency because of refusing the standard milk issuance. This guidance was provided by the Arizona State WIC Director, during a regular biweekly GoToMeeting on June 29th 2020. On November 16th 2020, the research team followed up on the update in 2% milk policy during a local agency WIC Directors meeting (n=18)

held virtually through GoToMeeting. The session was not recorded; however, meeting minutes were provided for any director who was unable to be present. Attendance was not recorded. The clarification during this meeting was delivered by the research team using a script that revisited the previous policy, why the policy change occurred, and restated the policy change.

Along with the policy clarification in the virtual meeting, the research team provided the directors with an email on November 17, 2020, that included a summary of the policy clarification and attached documents that included an FAQ that was encouraged to be provided to staff by the end of November. A pre-recorded PowerPoint training that included instructions that the local agency was able to use this PowerPoint or any other WIC trainings as additional tools for the 2% milk policy clarification in their local agency. An additional follow up email was sent to reinforce the policy change to WIC Directors one week later in November and the email instructed that the FAQ should be distributed to each staff member with documentation of receipt.

Measures

Redemption data were analyzed using the Arizona WIC Health and Nutrition Delivery System (HANDS) at three different intervals throughout the study. The three months prior to the policy change (baseline) which included March-May 2020, the first three months after the policy clarification was provided with no training (Intervention) which included July-September 2020, and the three months after the milk policy trainings (FAQ, PowerPoint, and/or in-house) was provided to staff, this post intervention periods included December 2020- February 2020.

Survey data.

Two separate surveys were delivered (via Qualtrics) to the 18 local agency directors (n=18) and their staff members (n=287). A consent form was included at the start of both surveys that informed the directors and staff members that completing the survey would not affect their performance, result in any penalty, or impact their ability to withdraw from the study at any time. The intent of this disclosure was to reduce any concerns or hesitation in participating in the survey. The survey was completed by first week in January 2021. No personally identifying information was collected, except for identifying the local agency for whom they worked.

Directors were asked to report the method(s) they utilized to train their staff. Staff were asked which method (FAQ, Zoom recording of PowerPoint, peer, word of mouth, local agency made training, or did not get the training), they received training. Staff and directors were both asked to rate their level of agreement (strongly disagree, disagree, agree, strongly agree) with the policy on allowing 2% milk to women and children at risk for nutritional deficiencies. Additionally, staff were asked to rate their level of understanding of the new policy (very poor, poor, average, good, excellent).

Measure: Staff training and method implement

a. Survey (staff) examining if staff recall receive training and which type of training was received (FAQ, Zoom recording of PowerPoint, peer, word of mouth, local agency made training, or did not get the training) and staff's reported level of understanding of the 2% milk policy (very poor, poor, average, good, excellent)

b. Survey (directors) examining type of training provided (FAQ, Zoom recording of PowerPoint, peer, word of mouth, local agency made training, or did not provide the training), and level of agreement with the 2% milk policy (strongly disagree, disagree, agree, strongly agree).

Redemption and Participation data.

Redemption data were analyzed using the Arizona WIC Health and Nutrition Delivery System (HANDS) at three different intervals throughout the study. The three months prior to the policy introduction (March-May 2020), redemption after policy introduction (July-September 2020), and redemption after policy clarification with 2% milk policy trainings (December 2020-February 2021). Redemption was measured as benefits issued versus benefits redeemed. Issuance to single or multiple beneficiaries was examined. The data received from ADHS was aggregated at the local agency level and included redemption data by each food category (milk, bread/whole grains, breakfast cereals, juice, legumes, peanut butter, cheese or tofu, eggs, fish, fruits and vegetables) and by milk type (2%, 1%, and fat-free). Analysis of redemption of 2% milk alone, all foods with 2% milk, and all foods without 2% milk was completed.

Agency-level descriptive data

Demographic data was also analyzed for descriptive purposes. This included the number of women and children, and the household size for which benefits were issued and redeemed each month. For each month, the level of education, race, ethnicity, and language of the authorized representative was also examined. Ethnicity was categorized

as “Hispanic or Latino” or “Non-Hispanic or Latino.” Race was categorized as American Indian or Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, Black or African American, White, or more than one. Education was categorized as less than high school Diploma or GED, high school or GED, more than high school, or unknown.

Statistical analyses.

Linear regressions were used to examine percent redeemed of food category/milk subcategory over time (baseline as compared to intervention and post-intervention, respectively), and adjusted for local agency site. Data were inspected for any issues, necessary omission and cleaned. Descriptive data are presented as mean +- standard deviation. Bivariate analysis (t-tests and chi-squares) compared the crude associations between the independent and dependent variables and the covariates and dependent variables. We examined differences over time for the mean difference redemption (milk and all food type) data using ANCOVA. All analyses were done using Stata analytical software version 15. Statistical significance was assessed at $p<0.05$

CHAPTER 4

RESULTS

Participant Profile

Descriptive information about the participants in each of the nine months of data observation is provided in Table 1. Each month, an average of 87,937 participants received benefits, 67% of participants being children and 33% being women (Table 1). The average household size for each of the 9 months observed was 4.25 (± 0.01). On average, average, the distribution for ethnicity was 65% Hispanic and 35% non- Hispanic for the authorized representative of each household. The average racial makeup for each benefit month included 81% White, 9% Black or African American, 3% Indian American or Native Alaskan, 1% Native Hawaiian or Other Pacific Islander, and 6% more than one race. The education level for the authorized representative is provided as an average for each month analyzed and grouped as less than High School diploma (21%), unknown level of education (<1%), high School or GED (43%) and more than High School or GED (36%). Most participants (81%) reported primarily speaking English, with 17% primarily speaking Spanish. Just 2% of the authorized representatives reported a primary language other than English or Spanish.

Table 1. Demographics across time amongst WIC participants in Arizona March 2020 - February 2021

	Baseline months			Intervention months			Post-intervention months		
	March 2020	April 2020	May 2020	July 2020	Aug 2020	Sep 2020	Dec 2020	Jan 2021	Feb 2021
Women	34% (29,137)	34% (29,269)	33% (28,886)	33% (28,387)	32% (28,269)	32% (28,573)	32% (28,390)	32% (28,102)	31% (27,984)
Children age 2 to 5	66% (55,744)	66% (58,067)	67% (58,352)	67% (58,863)	68% (59,629)	68% (60,887)	68% (61,133)	68% (60,618)	69% (61,143)
Race/ethnicity									
Hispanic	65% (70,802)	65% (72,375)	65% (72,365)	65% (72,230)	65% (72,654)	65% (73,969)	65% (73,758)	65% (73,374)	65% (73,441)
Not Hispanic	35% (38,211)	35% (39,155)	35% (38,838)	35% (38,555)	35% (38,728)	35% (39,175)	35% (39,794)	35% (39,160)	35% (39,169)
Black or African American	9% (9,734)	9% (10,020)	9% (9,932)	9% (9,695)	9% (9,836)	9% (9,981)	9% (10,153)	9% (9,985)	9% (1,074)
Indian American or Native Alaskan	3% (2,818)	3% (2,862)	3% (2,813)	3% (2,925)	3% (2,913)	3% (2,964)	3% (3,033)	3% (3,001)	3% (3,046)
Native -- Hawaiian or Other Pacific Islander	1% (600)	1% (604)	1% (620)	1% (630)	1% (595)	1% (610)	1% (626)	1% (650)	1% (657)
Asian	2% (1,655)	2% (1,695)	2% (1,716)	2% (1,743)	2% (1,809)	2% (1,792)	2% (1,705)	1% (1,673)	1% (1,674)
White	81% (88,163)	81% (90,001)	81% (89,753)	81% (89,460)	81% (89,868)	81% (91,390)	81% (91,568)	81% (90,929)	81% (90,904)
More than one race	6% (6,043)	6% (6348)	6% (6,369)	6% (6,332)	6% (6,361)	6% (6,407)	6% (6,467)	6% (6,296)	6% (6,255)
Education	21% (23,409)	21% (23,663)	21% (23,341)	21% (23,094)	21% (23,153)	21% (23,650)	21% (23,427)	21% (23,265)	21% (23,237)
Less than High School Diploma or GED									
High School or GED	43% (47,212)	43% (48,236)	43% (48,127)	43% (48,048)	43% (48,164)	43% (48,836)	44% (49,399)	44% (49,057)	44% (49,277)
More than High School	35% (38,190)	35% (39,422)	36% (39,540)	36% (39,419)	36% (39,832)	36% (40,416)	36% (40,456)	35% (39,944)	35% (39,822)
Unknown	<1% (202)	<1% (209)	<1% (195)	<1% (224)	<1% (233)	<1% (242)	<1% (270)	<1% (268)	<1% (274)
Household size (±0.01)	4.27	4.26	4.25	4.25	4.25	4.25	4.24	4.24	4.24
Language									
English	80% (87,559)	81% (90,085)	81% (89,950)	81% (89,684)	81% (90,263)	81% (91,728)	82% (92,635)	82% (91,767)	82% (91,836)
Spanish	17% (18,922)	17% (18,899)	17% (18,714)	17% (18,606)	17% (18,600)	17% (18,875)	16% (18,432)	16% (18,365)	16% (18,353)
Other	2% (2,532)	2% (2,546)	2% (2,539)	2% (2,495)	2% (2,519)	2% (2,541)	2% (2,485)	2% (2,402)	2% (2,421)

Staff and Director Surveys Analysis

Staff and director surveys were analyzed for descriptive purposes. It was found that 16 of the 19 directors for the local agencies who were invited to participate, completed the survey (Table 2). Of the 19 local agencies, 17 agencies participated in the staff survey with 189 respondents (Table 3). One agency did not participate in the local agency staff survey since the director serves as staff member delivery services. The other agency chose to not participate for both the director and staff survey.

Table 2. Director Participation

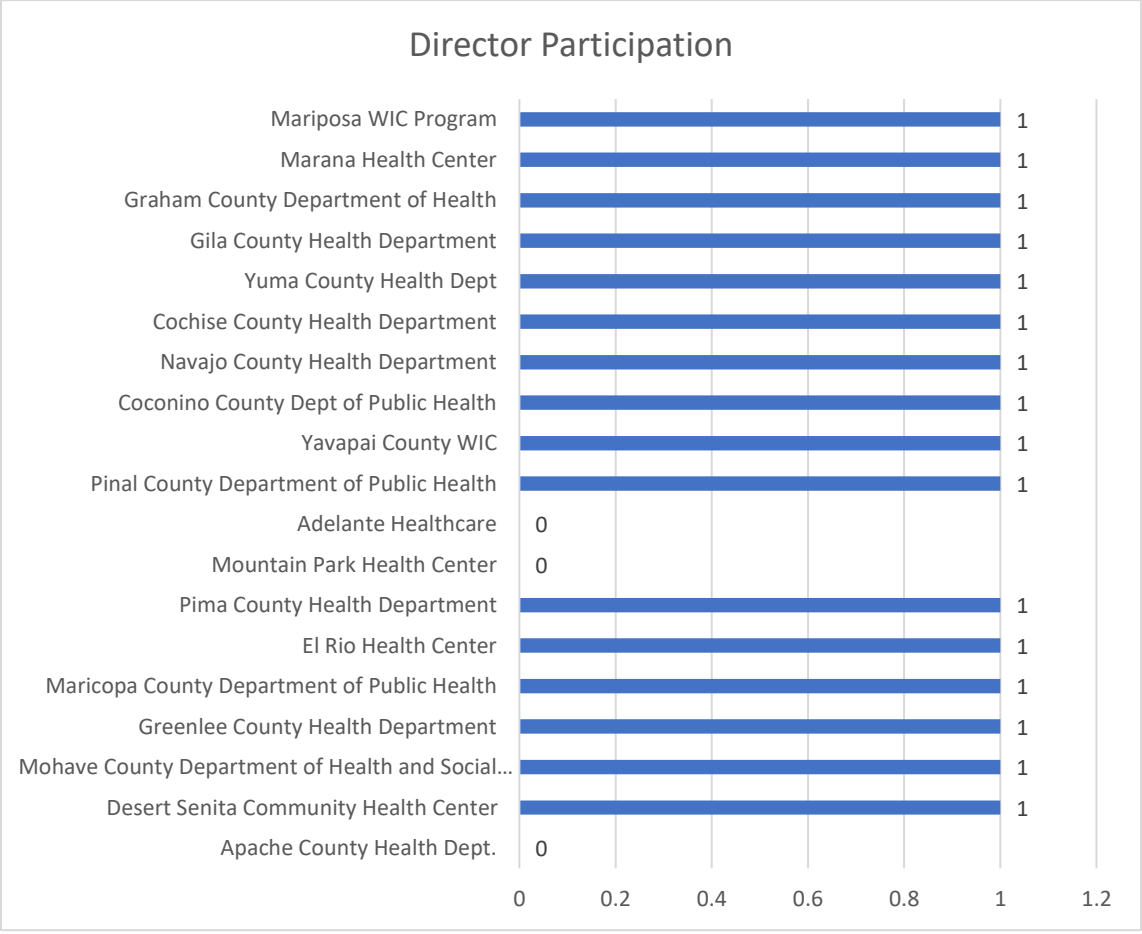
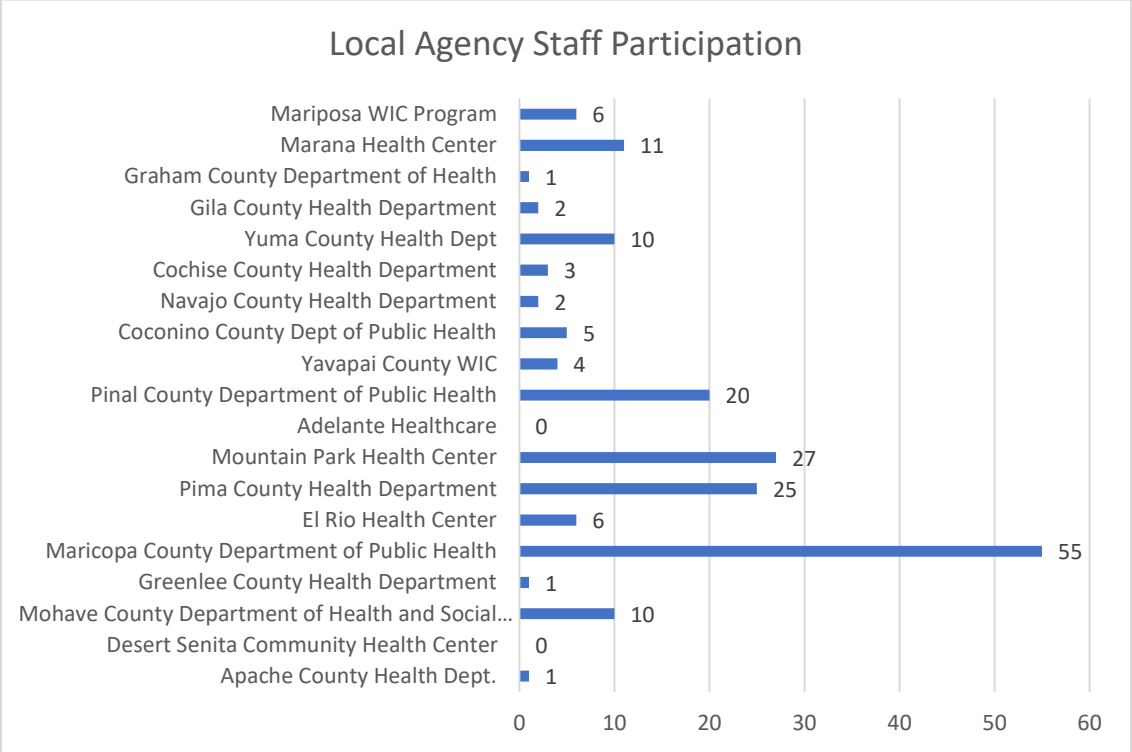


Table 3. Local Agency Staff Participation



The most frequently reported training method of the milk policy reported by staff was the pre-recorded PowerPoint provided by the research team 33% (Table 4). The FAQ provided by research team was reported by 29% of the local agency directors as the form of training they utilized for their staff (Table 5)

Table 4. Training Method Received by Staff

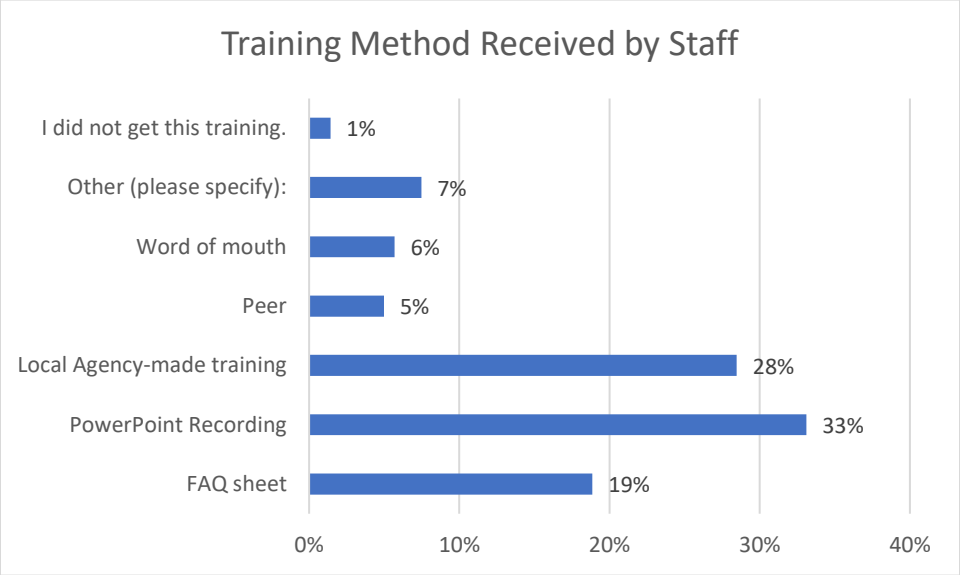
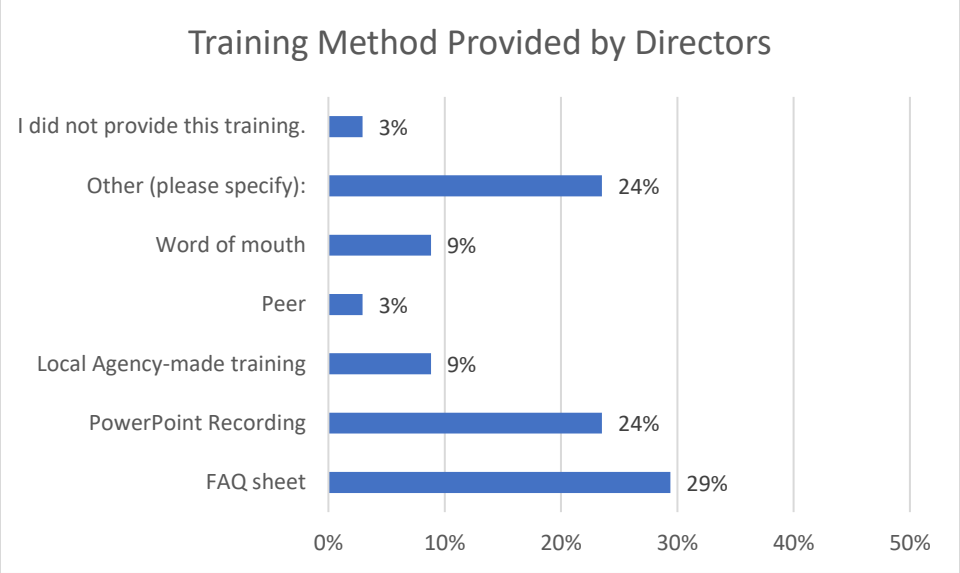


Table 5. Training Method Provided by Directors



When measuring level of agreement with the change to the policy for allowing 2% milk more than 75% of directors agreed (Table 6) and more than 80% of staff agreed (Table 7).

Table 6. Director's Level of Agreement with Policy

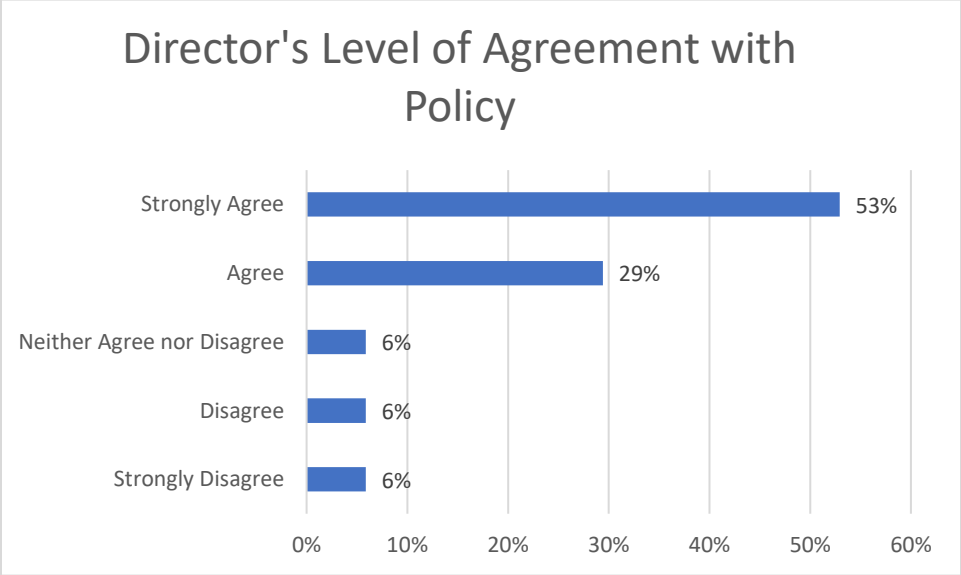
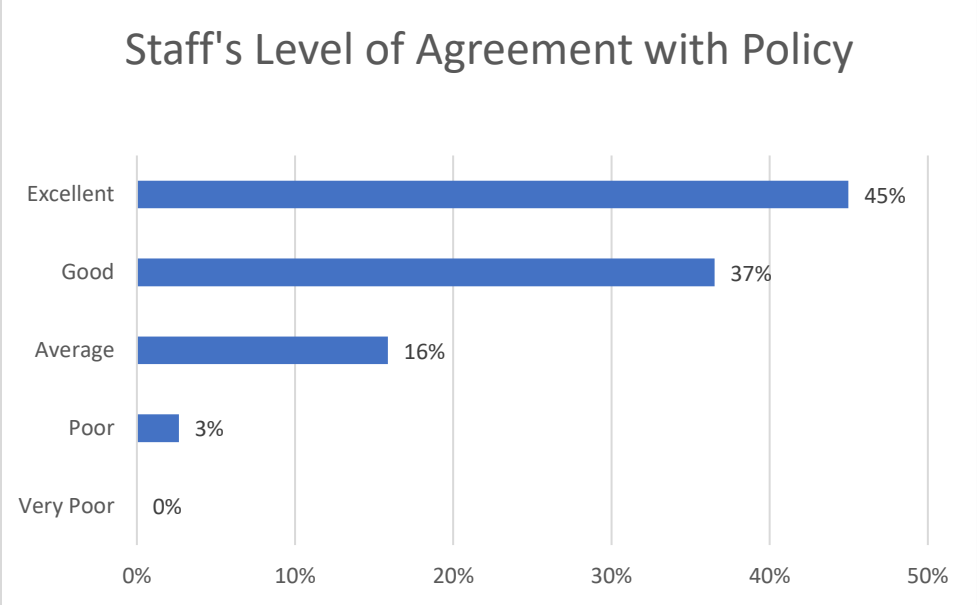
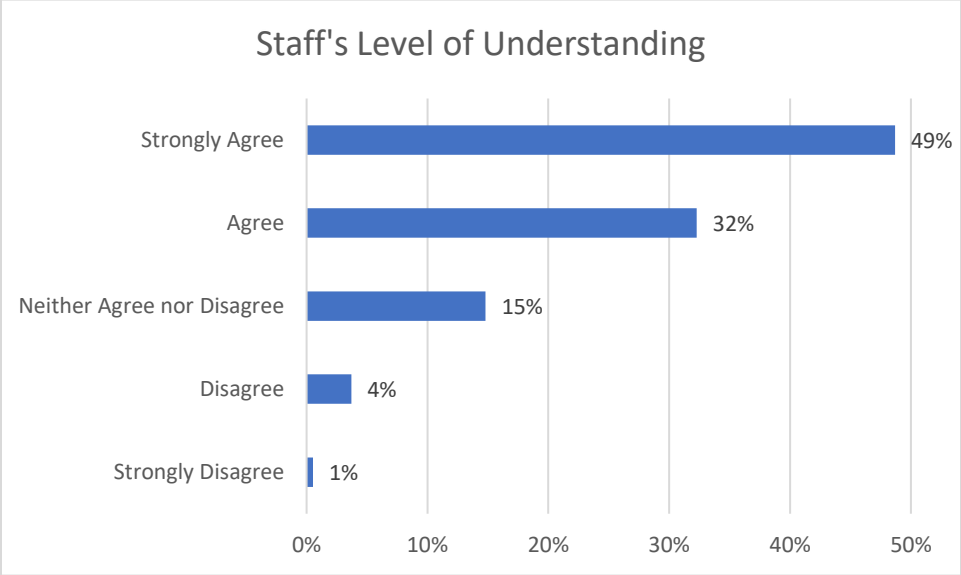


Table 7. Staff's Level of Agreement with Policy



Level of understanding of policy clarification training was measured for staff but not directors. It was found that greater than 80% of staff reported agreeing that they understood the clarification of the policy on issuance of 2% milk (Table 8).

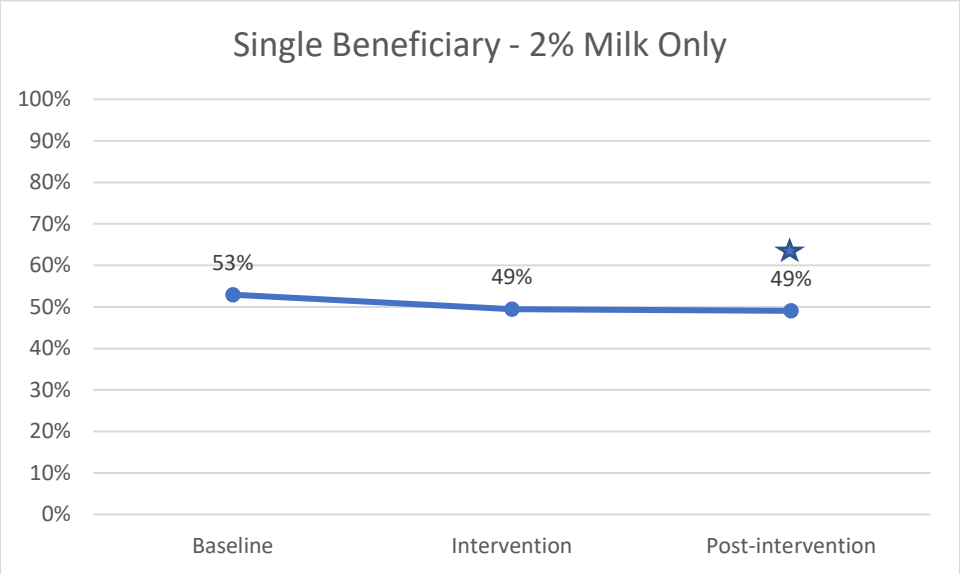
Table 8. Staff's Level of understanding



Redemption Analysis

Baseline redemption of all 2% milk for single beneficiary was found to be significant at 53% (p=0.000) (Table 9). Linear regression examining percent redeemed at the intervention period found no significant change with redemption at 49% (p=0.125), but significantly decreased at the post-intervention period at 47% (p=0.048). The local agency was a significant predictor for Single-beneficiary 2% milk redemption (p=0.002), but for multi-beneficiary redemption (p=0.770). In comparison, baseline redemption of all 2% milk for multi-beneficiary issuance was at 48% (Table 10). Neither the intervention nor the post-intervention was found to be statistically significant from baseline (58%) at 52% (p=0.131) and 48% (p=0.810), respectively.

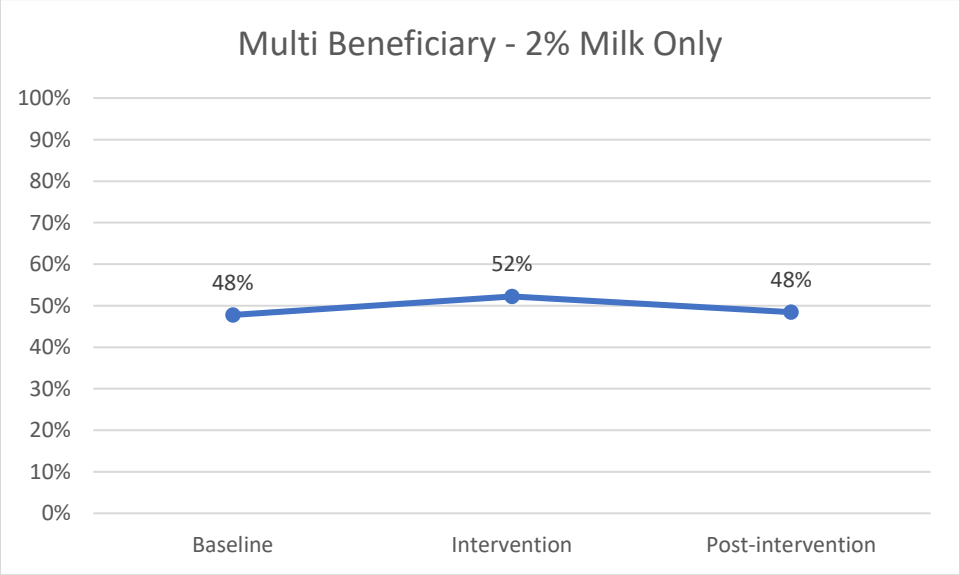
Table 9. Single Beneficiary 2% milk Only



1. Post-intervention was significant in the model (p=0.048)
2. Local agency was a statistically significant predictor in the model (p=0.002)

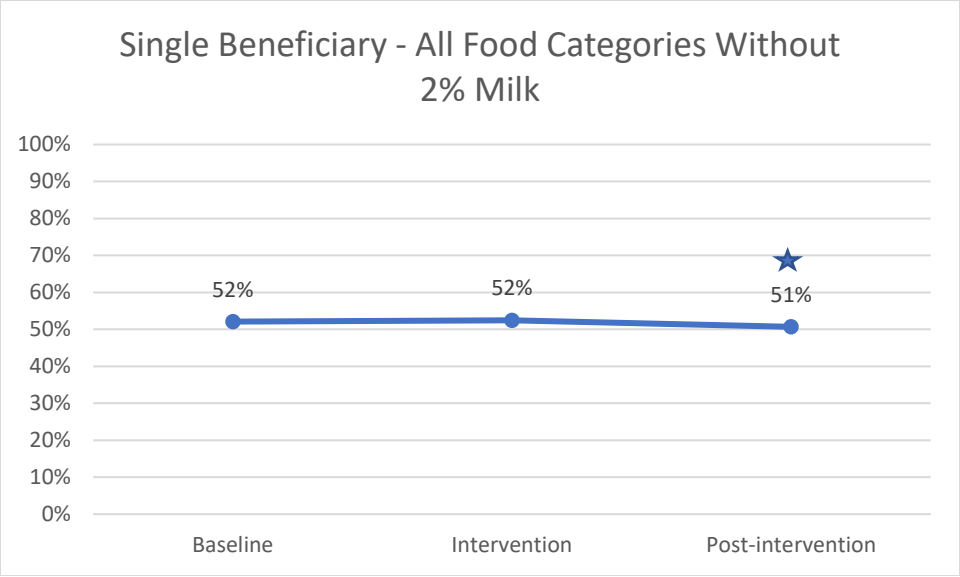
* Statistical significance at p< 0.05 compared to Baseline

Table 10. Multi Beneficiary 2% milk Only



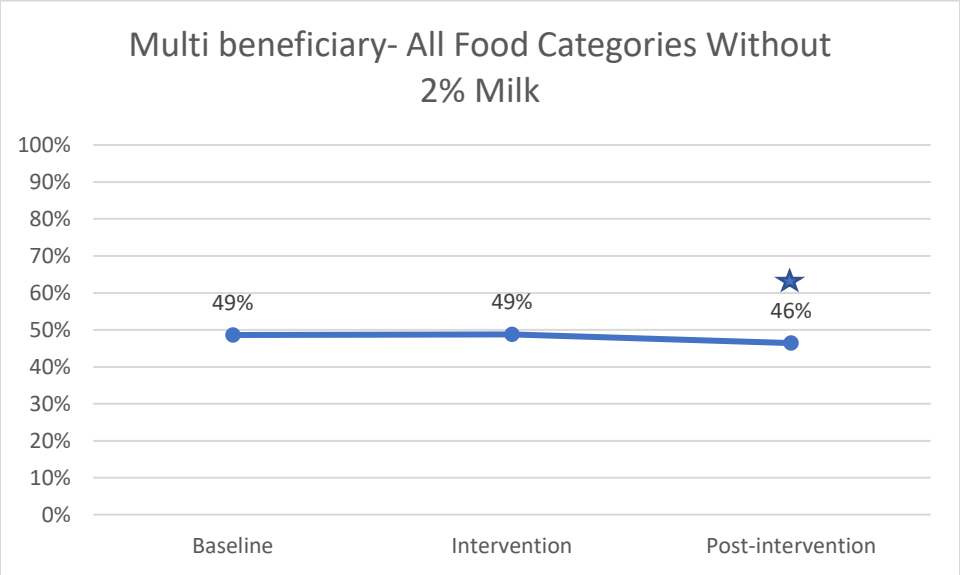
Analysis of all foods categories grouped together without 2% milk for single beneficiaries indicated a baseline redemption rate of 52% overall (Table 11). The redemption rate of all food categories was not statistically significant from baseline (52%) to the intervention period, with redemption at 52% (p= 0.604). The post-intervention was statistically significant different from baseline with redemption of 51% (p=0.015). Findings for the multi beneficiaries of all foods categories grouped together without 2% milk was similar with baseline being at 49% redemption (Table 12). There were no significant findings at intervention with 49% redemption (p= 0.843). The post-intervention period indicated a statistically significant decrease in redemption at 46% (p=0.014).

Table 11. Single Beneficiary all food categories without 2% milk



1. Post-intervention was significant in the model (p=0.015)
* Statistical significance at p< 0.05 compared to Baseline

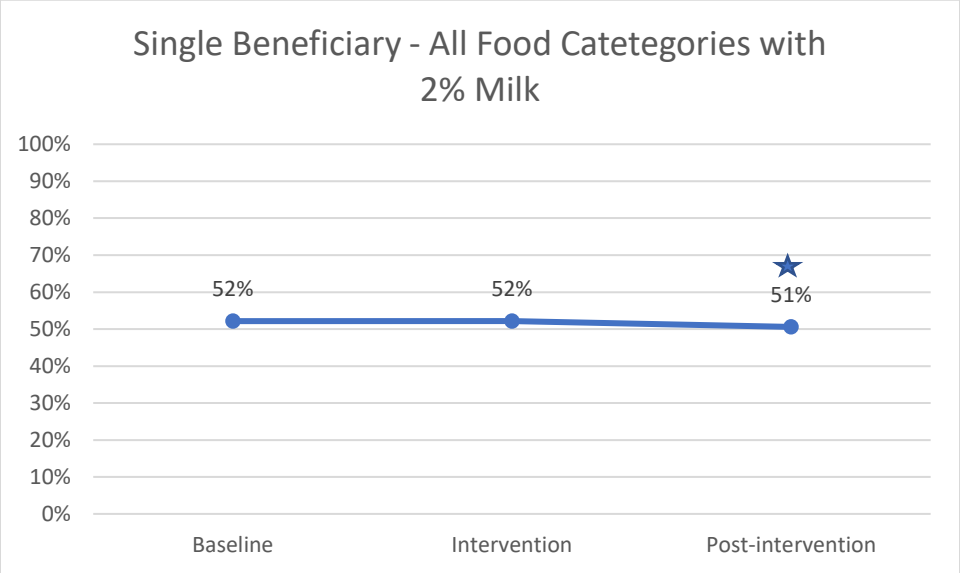
Table 12. Multi Beneficiary all food categories without 2% milk



1. Post-intervention was significant in the model (p=0.016)
 * Statistical significance at p< 0.05 compared to Baseline

When comparing redemption of all food categories with 2% milk (Table 13), it was found that single beneficiary redemption at intervention was not significant (p=0.998) A decrease in redemption was significant at the post intervention (p= 0.005). In comparison, for the multi beneficiary redemption (Table 14), the intervention was not significant (p=0.442) but did have a significant decrease in redemption in the post intervention (p=0.030).

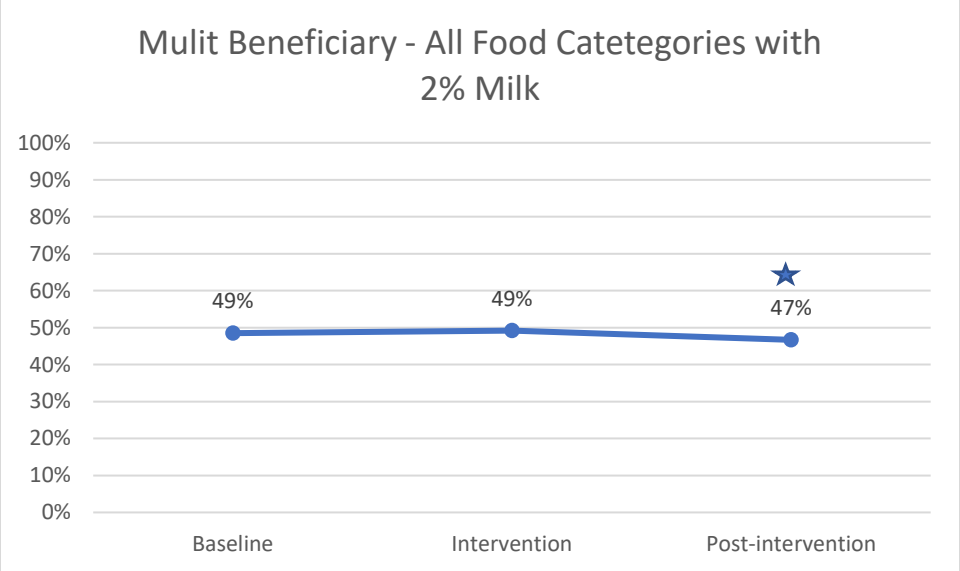
Table 13. Single Beneficiary all food categories with 2% milk



1. Post-intervention was significant in the model (p=0.005)

* Statistical significance at p< 0.05 compared to Baseline

Table 14 Multi Beneficiary all food categories with 2% milk



1. Post-intervention was significant in the model (p=0.030)

* Statistical significance at p< 0.05 compared to Baseline

Redemption data was graphed for comparing each of the single beneficiary categories and each of the multi beneficiary categories (Table 15 and 16). Individual foods were analyzed and included in this study as part of Appendix A.

Table 15. Single Beneficiary Redemptions

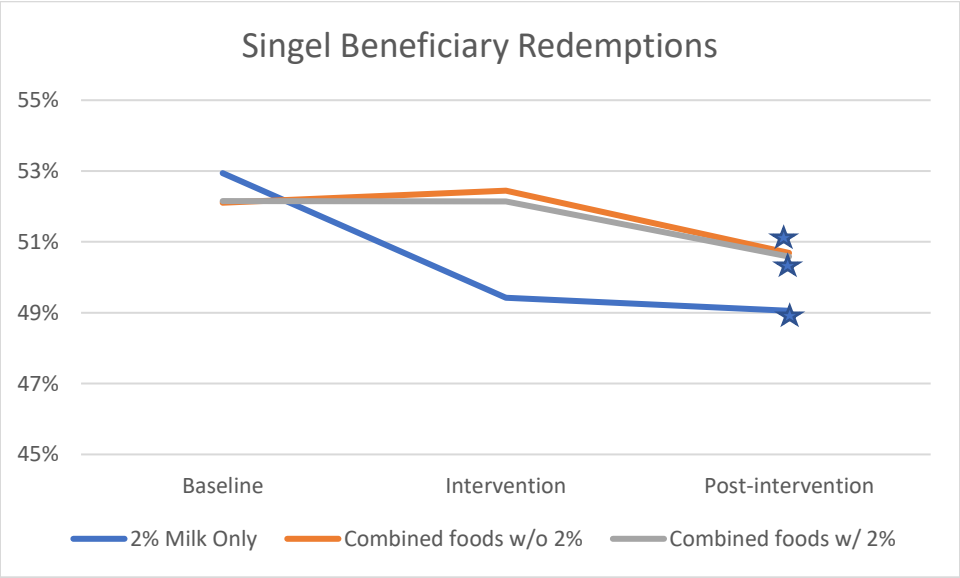
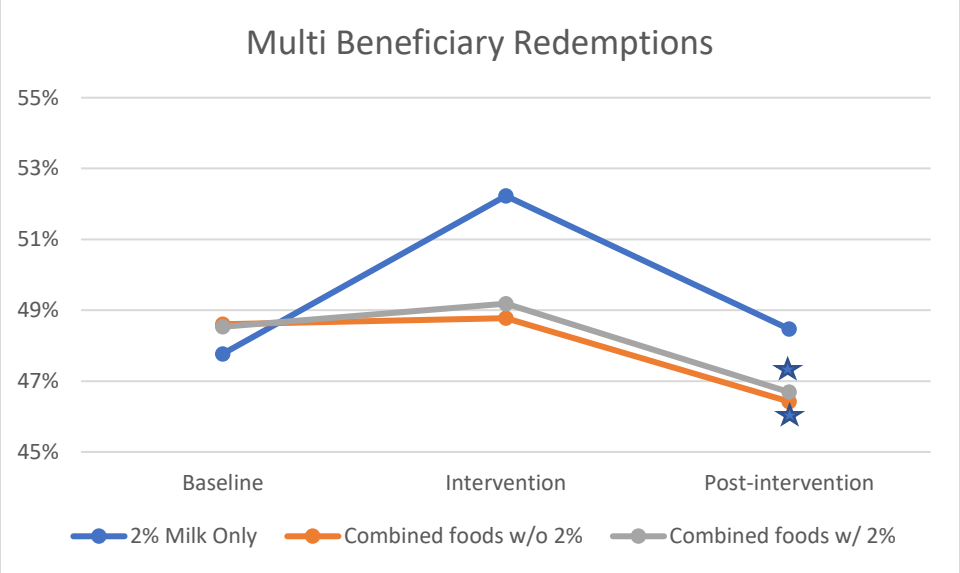


Table 16. Multi Beneficiary Redemptions



CHAPTER 5

DISCUSSION

Overview

The primary purpose of this study was to examine if allowing 2% milk issuance when WIC participants refused 1% or skim milk would improve the redemption of 2% milk issued and have a secondary effect on improving redemption of the other sub food categories (legumes, yogurt, cheese, eggs, cereals, whole grains, fruits, and vegetables). The data analysis individually examined the redemption (percent of benefits issued vs redeemed) of 2% milk alone, 2% grouped with all foods and foods grouped without 2% milk. While it was hypothesized that allowing 2% milk would improve the redemption of 2% milk alone and redemption of other sub foods categories, the linear regression analysis revealed that there were no significant findings for improved redemption of 2% milk alone at the intervention or post intervention intervals. The study did, however, find that there was a significant decrease in the redemption of 2% milk, and all foods grouped with 2% milk at the post intervention interval. These finding align with current research that shows a significant decrease in WIC participation, and consequently, redemption of benefits in recent years.[1, 2, 9, 15]

The decrease in redemptions found in this study during the post intervention period for 2% milk, all foods with and without 2% milk may be attributable to several factors beyond the limitations of the study. The study was conducted during peak times of the COVID-19 pandemic (i.e., March-May 2020 and December 2020-February 2021). Many challenges were faced by WIC participants during this time, including limited availability of groceries that resulted from panic buying seen worldwide.[78] Panic buying

was seen through individuals purchasing excessive amounts of essential goods that contributed to stores being low or out of stock of these goods,[78] Panic buying included increased purchasing of foods.[79] This limited stock of specific foods available for purchase to WIC participants would result in these foods not being able to be redeemed. Along with panic buying, changes in purchasing behavior also included increases in online food shopping.[79] Shelter in place orders during the pandemic drove consumers to make less trips to the stores.[79, 80] WIC participants may have also adopted this behavior and had less frequent visits to the stores but would have been unable to participate in online shopping as Arizona WIC benefits currently cannot be redeemed through the online shopping option. Retrospective studies to examine the factors why redemptions decreased are needed.

Another factor that can be attributed to these findings may be the short observation period that was selected of only three months post intervention. A non-experimental study makes it difficult to clearly link the impact of the policy change, as other factors such as store environment, participant purchasing behavior, policies and laws instated during the pandemic, could have contributed to the results.[81] The combination of an observational study that look a short time frame to assess the effectiveness of the policy change could possibly have been a factor in the results that were obtained. Future research is needed to further examine the impacts of policy change over time. These future studies would need to control for other factors, such as those listed above. Potentially, future studies can use cross-sectional or case study designs to help reduce these factors[81]

While the demographic data and staff and director survey results that were obtained were only used for descriptive purposes, these did provide notable findings. Based on how benefits are issued monthly to participants completely WIC appointments at different periods throughout the year, each benefit month reflects a different cohort of participants.

The surveys had a high participation rate with 69% of the staff responding to the survey and 84% WIC directors participating in the director survey. The directors that participated in the survey reported proving the training to their staff. Staff reported receiving training and having a good understanding of the policy change, which aligned with the hypothesis for this study: Is providing WIC staff with more information on 2% milk issuance policies related to their knowledge on milk issuance? Although the FAQ provided by the research team was the only type of training that was highly encouraged to be provided to all staff, most staff reported the prerecorded PowerPoint provided by the research team as the method of training they received. Lastly, for both the directors and staff surveys, most responses indicate that there was agreement on issuance of 2% milk when clients refuse issuance of 1% or non-fat milk. Staff and director agreement with issuance of 2% milk may be an indication of what current literature has already found and which staff may be aware of through conversation they have with participants and information they receive through trainings. It may indicate that staff understand the importance of consuming any milk to better meet nutrient intake of certain vitamins and minerals,[22, 37] and that current decrease in participation may be due to the reduced value participants place on the WIC food package due to restrictions such as those placed on milk.[16] These descriptive measures may be valuable for future research that focus on

trends among specific demographic groups and food choices, purchase behavior and milk selection within the WIC program by these groups. Staff and director understanding of policy is critical in implementation and the outcomes of policy change, which remains an area in WIC that has not been extensively explored.

Along with the gap in research on policy change, there also is limited research on how specific foods in the WIC food package affect overall redemption. Further research is needed on how changes in policy regarding food options in the WIC food package affect redemption. Furthermore, changes in policy take time to implement and for the effects to be seen. Future research is needed that examines more extensive time frames that focus on short, intermediate, and long-term outcomes. To the knowledge of the research team, this study was the first of its kind, and was limited in that it only looked at the three months after the intervention was completed.

Strengths and Limitations

This study had many strengths, but it was not without limitations. Objective data were obtained directly from the Arizona Department of Health Services' (ADHS) Health and Nutrition Delivery System (HANDS). A limitation of this data was that although there were a great number of redemption values for each month that were analyzed, the data itself was aggregated at the agency level. Aggregated data at the agency level reduces the ability to assess differences in sub-populations in redeeming their WIC food benefits, which could help to explain the findings for this study. Additionally, this was an observational study and causality could not be determined.

For the descriptive results that were obtained through the staff and director surveys, the number of respondents from the survey were well over half of the WIC staff members invited to take the survey, and this comprised a great majority of the total Arizona WIC staff issuing food benefits to participants at the measured time frames. Bias in survey responses was reduced by not disclosing to the WIC staff the goals of the study: staff were only advised that the survey was to assess understanding of the policy on 2% milk issuance. Most of the local agencies participated in either the staff or director survey, except for one agency.

Implications for Policy and Practice

There were multiple factors that could have contributed to the result of this study. These factors may have contributed to the decrease in redemption and may not have necessarily been the result of the change in policy. Changes in these types of policy may provide favorable outcomes in periods of better food availability and safer shopping experiences for participant in contrast to the current store environment, purchasing behavior and availability of foods that have resulted from the COVID 19 pandemic. Further research should focus on non-aggregated data to allow for better analytical methods that could provide more valuable data to better asses the effectiveness of these types of policy changes in terms of redemption. As previous studies have found, the value that participants place on the WIC food package remains an important area of study and possibly a means to improve redemption of benefits which would consequently counteract the downward trend that has been seen in recent years for WIC participation.

CHAPTER 6

CONCLUSION

Conclusion

Participation in the WIC program provides families with supplemental foods that have been shown to improve the overall health status of WIC participants. Current studies have demonstrated the health benefits associated with participation in the WIC program, however, participation continues to decline. Research has attributed this declined to several factors that include perceived stigma with participating in the WIC program, the participant's shopping experience, and satisfaction with food choices offered by WIC. It was the aim of this study to examine changes in redemption of WIC foods if the issuance of higher fat milk is allowed when clients decline low fat options. This study found a statistically significant ($p=<0.05$) decrease in redemption of 2% milk, all foods with 2% milk and all foods without 2% milk in the post intervention periods. There are several factors that could have contributed these findings that include the limited food stock and less frequent visits to the stores by participants as a result of the COVID-19 pandemic during the months examined by this study. Further research is needed in a post-pandemic environment to re-examine the effects of policy change on specific WIC foods, such as milk, and changes to WIC foods benefit redemption. This remains a critical area of focus to counter the recent decline in WIC participation.

REFERENCES

1. Food and Nutrition Service. (n.d.). Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). U.S Department of Agriculture. Retrieved November 28, 2021, from https://www.fns.usda.gov/wic/about-wic.
2. Food and Nutrition Service. Data and Research. WIC Data Tables. U.S Department of Agriculture. Updated January 14, 2022. Retrieved 16, 2022, from https://fns-prod.azureedge.net/sites/default/files/resource-files/wisummary-1.pdf.
3. Arizona Department of Health Services (n.d). Arizona WIC. WIC Local Agencies. Retreived 01/13/2022 from https://azdhs.gov/prevention/azwic/agencies/index.php#employment.
4. Metallinos-Katsaras E, Gorman KS, Wilde P, Kallio J. A longitudinal study of WIC participation on household food insecurity. *Matern Child Health J.* 2011;15:627-633.
5. Guan A, Hamad R, Batra A, Bush NR, Tylavsky FA, LeWinn KZ. The Revised WIC Food Package and Child Development: A Quasi-Experimental Study. *Pediatrics.* 2021;147.
6. Hamad R, Batra A, Karasek D, et al. The Impact of the Revised WIC Food Package on Maternal Nutrition During Pregnancy and Postpartum. *Am J Epidemiol.* 2019;188:1493-1502.
7. Weinfield NS, Borger C, Au LE, Whaley SE, Berman D, Ritchie LD. Longer Participation in WIC Is Associated with Better Diet Quality in 24-Month-Old Children. *J Acad Nutr Diet.* 2020;120:963-971.
8. Oliveira, Victor and Elizabeth Frazão. The WIC Program: Background, Trends, and Economic Issues, 2015 Edition, EIB-134, U.S. Department of Agriculture, Economic Research Service, January 20152015.
9. Chaparro MP, Crespi CM, Anderson CE, Wang MC, Whaley SE. The 2009 Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) food package change and children's growth trajectories and obesity in Los Angeles County. *Am J Clin Nutr.* 2019;109:1414-1421.
10. National Academies of Sciences, Engineering, and Medicine. 2017. Review of WIC food packages: Improving balance and choice: Final report. Washington, DC: The National Academies Press. doi: https://doi.org/10.17226/23655.
11. Au LE, Paolicelli C, Gurzo K, et al. Contribution of WIC-Eligible Foods to the Overall Diet of 13- and 24-Month-Old Toddlers in the WIC Infant and Toddler Feeding Practices Study-2. *J Acad Nutr Diet.* 2019;119:435-448.
12. Siega-Riz AM, Kranz S, Blanchette D, Haines PS, Guilkey DK, Popkin BM. The effect of participation in the WIC program on preschoolers' diets. *J Pediatr*. 2004;144:229-234.
13. Chiasson MA, Findley SE, Sekhobo JP, et al. Changing WIC changes what children eat. *Obesity (Silver Spring).* 2013;21:1423-1429.
14. U.S. Department of Agriculture, Food and Nutrition Service WIC Participant and Program Characteristics 2018. Alexandria, VA: Kline, N., Thorn, B., Bellows, D., Wroblewska, K., & Wilcox-Cook, E. Project Officer: Grant Lovellette. (2020).

15. Badaracco C. Declining WIC Participation May Lead to Poorer Health Outcomes. Avalere website. https://avalere.com/insights/declining-wic-participation-may-lead-to-poorer-health-outcomes. Published September 09, 2020. Accessed January 16, 2022.

16. Weber SJ, Wichelecki J, Chavez N, Bess S, Reese L, Odoms-Young A. Understanding the factors influencing low-income caregivers' perceived value of a federal nutrition programme, the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). *Public Health Nutr.* 2019;22:1056-1065.

17. Chauvenet C, De Marco M, Barnes C, Ammerman AS. WIC Recipients in the Retail Environment: A Qualitative Study Assessing Customer Experience and Satisfaction. *J Acad Nutr Diet.* 2019;119:416-424 e412.

18. USDA Improves the WIC Shopping Experience to Better Serve our Nation's Low-Income, New and Expecting Mothers and Their Young Children (. U.S. Department of Agriculture. Food and Nutrition Service. https://www.fns.usda.gov/pressrelease/2016/005316#:~:text=The%20transition%20from%20paper%20benefits%20to%20EBT%20systems%20allows%20WIC,or%20lose%20the%20remaining%20benefits.&text=Additionally%2C%20WIC%20participants%20will%20no,from%20their%20other%20grocery%20items. Published February 29, 2016. Accessed January 29, 2022.

19. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary Guidelines for Americans, 2020-2025. 9th Edition. December 2020. Available at DietaryGuidelines.gov.

20. Weber S, Uesugi K, Greene H, Bess S, Reese L, Odoms-Young A. Preferences and Perceived Value of WIC Foods Among WIC Caregivers. *J Nutr Educ Behav.* 2018;50:695-704.

21. Dennison BA, Erb TA, Jenkins PL. Predictors of dietary milk fat intake by preschool children. *Prev Med.* 2001;33:536-542.

22. Quann EE, Fulgoni VL, 3rd, Auestad N. Consuming the daily recommended amounts of dairy products would reduce the prevalence of inadequate micronutrient intakes in the United States: diet modeling study based on NHANES 2007-2010. *Nutr J.* 2015;14:90.

23. Foods & Drinks for 6 to 24 Month Olds. Centers for Disease Control and Prevention. Nutrition. https://www.cdc.gov/nutrition/infantandtoddlernutrition/foods-and-drinks/cows-milk-and-milk-alternatives.html. Published on July 23, 2021. Accessed on January 29, 2022.

24. Payne CR, Niculescu M, Guthrie J, et al. Can a Better Understanding of WIC Customer Experiences Increase Benefit Redemption and Help Control Program Food Costs?J Hunger Environ Nutr. 2018; 13(2):,143–153.

25. Agricultural Research (n.d.). U.S. Deparment of Agriculture. Food Data Central. Retrieved 01/15/2022 from https://fdc.nal.usda.gov/fdc-app.html#/food-details/746772/nutrients

26. Gao X, Wilde PE, Lichtenstein AH, Tucker KL. Meeting adequate intake for dietary calcium without dairy foods in adolescents aged 9 to 18 years (National

Health and Nutrition Examination Survey 2001-2002). *J Am Diet Assoc.* 2006;106:1759-1765.
27. Thorning TK, Raben A, Tholstrup T, Soedamah-Muthu SS, Givens I, Astrup A. Milk and dairy products: good or bad for human health? An assessment of the totality of scientific evidence. *Food Nutr Res.* 2016;60:32527.
28. Brown-Riggs C. Nutrition and Health Disparities: The Role of Dairy in Improving Minority Health Outcomes. *Int J Environ Res Public Health.* 2015;13:ijerph13010028.
29. Marangoni F, Pellegrino L, Verduci E, et al. Cow's Milk Consumption and Health: A Health Professional's Guide. *J Am Coll Nutr.* 2019;38:197-208.
30. Beck AL, Heyman M, Chao C, Wojcicki J. Full fat milk consumption protects against severe childhood obesity in Latinos. *Prev Med Rep.* 2017;8:1-5.
31. Vanderhout SM, Birken CS, Parkin PC, et al. Relation between milk-fat percentage, vitamin D, and BMI z score in early childhood. *Am J Clin Nutr.* 2016;104:1657-1664.
32. Mannion CA, Gray-Donald K, Koski KG. Association of low intake of milk and vitamin D during pregnancy with decreased birth weight. *CMAJ.* 2006;174:1273-1277.
33. Andreyeva T, Luedicke J, Henderson KE, Schwartz MB. The positive effects of the revised milk and cheese allowances in the special supplemental nutrition program for women, infants, and children. *J Acad Nutr Diet.* 2014;114:622-630.
34. Ishdorj. Ishdorj A & Capps O (2017) The Impact of Policy Changes on Milk and Beverage Consumption of Texas WIC Children. Agricultural and Resource Economics Review 46, 421–442. Cambridge University Press.
35. Nicholl A, Deering KE, Evelegh K, et al. Whole-fat dairy products do not adversely affect adiposity or cardiometabolic risk factors in children in the Milky Way Study: a double-blind randomized controlled pilot study. *Am J Clin Nutr.* 2021.
36. Black RE, Williams SM, Jones IE, Goulding A. Children who avoid drinking cow milk have low dietary calcium intakes and poor bone health. *Am J Clin Nutr.* 2002;76:675-680.
37. Hess JM, Cifelli CJ, Fulgoni Iii VL. Energy and Nutrient Intake of Americans according to Meeting Current Dairy Recommendations. *Nutrients.* 2020;12.
38. Fulgoni V, 3rd, Nicholls J, Reed A, et al. Dairy consumption and related nutrient intake in African-American adults and children in the United States: continuing survey of food intakes by individuals 1994-1996, 1998, and the National Health And Nutrition Examination Survey 1999-2000. *J Am Diet Assoc.* 2007;107:256-264.
39. Panely CV, Johnson RK, Wang MQ. Predictors of Milk Consumption in U.S. School-Aged Children. J Am Diet Assoc. 1998;98(9): A52.
40. Storey ML, Forshee RA, Anderson PA. Beverage consumption in the US population. *J Am Diet Assoc.* 2006;106:1992-2000.
41. Rimkus L, Isgor Z, Ohri-Vachaspati P, et al. Disparities in the Availability and Price of Low-Fat and Higher-Fat Milk in US Food Stores by Community Characteristics. *J Acad Nutr Diet.* 2015;115:1975-1985.

42. McCarthy KS, Lopetcharat K, Drake MA. Milk fat threshold determination and the effect of milk fat content on consumer preference for fluid milk. *J Dairy Sci.* 2017;100:1702-1711.
43. Harwood WS, Drake MA. Identification and characterization of fluid milk consumer groups. *J Dairy Sci.* 2018;101:8860-8874.
44. McCarthy KS, Parker M, Ameerally A, Drake SL, Drake MA. Drivers of choice for fluid milk versus plant-based alternatives: What are consumer perceptions of fluid milk? *J Dairy Sci.* 2017;100:6125-6138.
45. Heaney RP. Dairy intake, dietary adequacy, and lactose intolerance. *Adv Nutr.* 2013;4:151-156.
46. Scrimshaw NS, Murray EB. The acceptability of milk and milk products in populations with a high prevalence of lactose intolerance. *Am J Clin Nutr.* 1988;48:1079-1159.
47. Nicklas TA, Qu H, Hughes SO, et al. Self-perceived lactose intolerance results in lower intakes of calcium and dairy foods and is associated with hypertension and diabetes in adults. *Am J Clin Nutr.* 2011;94:191-198.
48. Matlik L, Savaiano D, McCabe G, VanLoan M, Blue CL, Boushey CJ. Perceived milk intolerance is related to bone mineral content in 10- to 13-year-old female adolescents. *Pediatrics.* 2007;120:e669-677.
49. Nicklas TA, O'Neil CE, Fulgoni VL, 3rd. The role of dairy in meeting the recommendations for shortfall nutrients in the American diet. *J Am Coll Nutr.* 2009;28 Suppl 1:73S-81S.
50. Kline N, Thorn, B., Bellows, D., Wroblewska, K., & Wilcox-Cook, E. WIC Participant and Program Characteristics 2018. Alexandria, VA: U.S. Department of Agriculture, Food and Nutrition Service; 2020.
51. WIC Program Overview and History (n.d). National WIC Association. Retrieved January 11, 2022 from https://www.nwica.org/overview-and-history.
52. Besharov DJ, Germanis P. Evaluating WIC. *Eval Rev.* 2000;24:123-190.
53. Breastfeeding Policy and Guidance. Food and Nutrition Services (July 2016). Special Supplemental Nutrition Program for Women, Infants, and Children (WIC). U.S Department of Agriculture. Retrieved January 12, 2022 from https://wicworks.fns.usda.gov/sites/default/files/media/document/WIC-Breastfeeding-Policy-and-Guidance_1.pdf.
54. Liu CH, Liu H. Concerns and Structural Barriers Associated with WIC Participation among WIC-Eligible Women. *Public Health Nurs.* 2016;33:395-402.
55. U.S. Department of Agriculture April 2021. Economic Research Service. WIC Program. Retreived January 14, 2022 from https://www.ers.usda.gov/topics/food-nutrition-assistance/wic-program/.
56. Schultz DJ, Byker Shanks C, Houghtaling B. The Impact of the 2009 Special Supplemental Nutrition Program for Women, Infants, and Children Food Package Revisions on Participants: A Systematic Review. *J Acad Nutr Diet.* 2015;115:1832-1846.

57. Andreyeva T, Tripp AS. The healthfulness of food and beverage purchases after the federal food package revisions: The case of two New England states. *Prev Med.* 2016;91:204-210.
58. Gleason S, Pooler J. The Effects of Changes in WIC Food Packages on Redemptions. Final Report. Contractor and Cooperator Report No. 69; 2011.
59. Whaley SE, Ritchie LD, Spector P, Gomez J. Revised WIC food package improves diets of WIC families. *J Nutr Educ Behav.* 2012;44:204-209.
60. Meiqari L, Torre L, Gazmararian JA. Exploring the Impact of the New WIC Food Package on Low-Fat Milk Consumption Among WIC Recipients: A Pilot Study. *J Health Care Poor Underserved.* 2015;26:712-725.
61. Sonchak L. The Impact of WIC on Birth Outcomes: New Evidence from South Carolina. *Matern Child Health J.* 2016;20:1518-1525.
62. Fingar KR, Lob SH, Dove MS, Gradziel P, Curtis MP. Reassessing the Association between WIC and Birth Outcomes Using a Fetuses-at-Risk Approach. *Matern Child Health J.* 2017;21:825-835.
63. Currie J, Rajani I. Within-Mother Estimates of the Effects of WIC on Birth Outcomes in New York City. *Econ Inq.* 2015;53:1691-1701.
64. Hamad R, Collin DF, Baer RJ, Jelliffe-Pawlowski LL. Association of Revised WIC Food Package With Perinatal and Birth Outcomes: A Quasi-Experimental Study. *JAMA Pediatr.* 2019.
65. Bersak T, Sonchak L. The Impact of WIC on Infant Immunizations and Health Care Utilization. *Health Serv Res.* 2018;53 Suppl 1:2952-2969.
66. Testa A, Jackson DB. Race, ethnicity, WIC participation, and infant health disparities in the United States. *Ann Epidemiol.* 2021;58:22-28.
67. Hill AM, Nunnery DL, Ammerman A, Dharod JM. Racial/Ethnic Differences in Diet Quality and Eating Habits Among WIC Pregnant Women: Implications for Policy and Practice. *Am J Health Promot.* 2020;34:169-176.
68. Bitler MP, Currie J. Does WIC work? The effects of WIC on pregnancy and birth outcomes. *J Policy Anal Manage.* 2005;24:73-91.
69. Davis CF, Lazariu V, Sekhobo JP. Smoking cessation in the WIC program. *Matern Child Health J.* 2010;14:474-477, discussion 478-484.
70. Arteaga H, Heflin C, Gable, S. The impact of aging out of WIC on food security in households with children. Children and Youth Services Review. 2016; (69): 82–96. .
71. Owen AL, Owen GM. Twenty years of WIC: a review of some effects of the program. *J Am Diet Assoc.* 1997;97:777-782.
72. Lee JY, Rozier RG, Norton EC, Kotch JB, Vann WF, Jr. Effects of WIC participation on children's use of oral health services. *Am J Public Health.* 2004;94:772-777.
73. Pan L, Blanck HM, Park S, et al. State-Specific Prevalence of Obesity Among Children Aged 2-4 Years Enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children - United States, 2010-2016. *MMWR Morb Mortal Wkly Rep.* 2019;68:1057-1061.
74. Kreider B, Pepper JV, Roy M. Identifying the Effects of WIC on Food Insecurity Among Infants and Children. *Southern Economic Journal.* 2016;82:1106-1122.

75. Tester JM, Leung CW, Crawford PB. Revised WIC Food Package and Children's Diet Quality. *Pediatrics.* 2016;137.
76. Hurley KM, Oberlander SE, Merry BC, Wrobleski MM, Klassen AC, Black MM. The healthy eating index and youth healthy eating index are unique, nonredundant measures of diet quality among low-income, African American adolescents. *J Nutr.* 2009;139:359-364.
77. Deehy K, Hoger FS, Kallio J, et al. Participant-centered education: building a new WIC nutrition education model. *J Nutr Educ Behav.* 2010;42:S39-46.
78. Chua G, Yuen KF, Wang X, Wong YD. The Determinants of Panic Buying during COVID-19. *Int J Environ Res Public Health.* 2021;18.
79. Ellison B, McFadden B, Rickard BJ, Wilson NLW. Examining Food Purchase Behavior and Food Values During the COVID-19 Pandemic. Applied economic perspectives and policy. 2020;43:(1)58–72.
80. Emily H. Belarmino FB, Thomas Wentworth, Erin Biehl, Roni Neff, Meredith T. Niles. Early COVID-19 Impacts on Food Retail and Restaurants: Consumer Perspectives from Vermont. College of Agricultural and Life Sciences Faculty Publications The University of Vermont 2020.
81. National Center for Injury Prevention and Control. Centers for Disease Control. Step by Step- Evaluating Violence and Injury Prevention Policies Brief 5: Evaluating Policy Impact. https://www.cdc.gov/injury/pdfs/policy/Brief%205-a.pdf Accessed March 21, 2022. .

APPENDIX A

INSTITUTIONAL REVIEW BOARD

INSTRUCTIONS

- Complete each section of the application. Based on the nature of the research being proposed some sections may not apply. Those sections can be marked as N/A. Remember that the IRB is concerned with risks and benefits to the research participant and your responses should clearly reflect these issues. You (the PI) need to retain the most recent protocol document for future revisions. Questions can be addressed to research.integrity@asu.edu.
- **PIs are reminded that not all people considering this application will be specialized in the PI's area of expertise. Language used should reflect this fact.**
- When you write a protocol, keep an electronic copy. You will need to modify this copy when making changes.

IRB: 1. Protocol Title

Include the full protocol title: How does allowing issuance of 2% milk on the WIC food package for children older two and all women categories affect benefit redemption

IRB: 2. Background and Objectives

Provide the scientific or scholarly background for, rationale for, and significance of the research based on the existing literature and how will it add to existing knowledge.

2.1 List the specific aims or research questions in 300 words or less.
2.2 Refer to findings relevant to the risks and benefits to participants in the proposed research.
2.3 Identify any past studies by ID number that are related to this study. If the work was done elsewhere, indicate the location.

TIPS for streamlining the review time:

✓ Two paragraphs or less is recommended.
✓ Do not cut and paste of entire scope sections for grant proposal, thesis or dissertation. The IRB will request additional information if needed.

Response:

This study will assess the effect of liberalizing the WIC food package, specifically the milk benefits, on benefit redemption. Previously Arizona WIC provided a standard issuance of 1% or fat free milk for child categories (ages 2-4) and all women categories. Over the past five years, there continues to be a downward trend on client participation in the AZ WIC program, with a significant dropout rate at the two-year-old category. This study will examine if allowing clients to select 2% milk for C2-C4 and all women categories based on client preference will improve benefit redemption for milk. We will also examine how redemption of other food categories such as fruits and vegetables are affected with the issuance of 2% milk.

As Weber et al (2018) found caregivers place a higher value on the infant food package and while the lesser restricted food voucher benefits for fruits and vegetables has improved the value placed on the program, food restrictions as seen with the milk benefit diminishes the value caregivers placed on the overall food package. By allowing participants to select 2% milk as a preference we can examine if the value on the food package placed by caregivers improves and allows for better redemption of the milk benefits and possibly other food categories.

IRB: 3. Data Use - What are the intended uses of the data generated from this project?

Examples include: Dissertation, thesis, undergraduate project**,** publication/journal article, conferences/presentations**,** results released to agency, organization**,** employer, or school**.** If other, then describe.

Response:

The intent of this study is to use the data for a thesis and publication/journal article.

IRB: 4. Inclusion and Exclusion Criteria

4.1 List criteria that define who will be included or excluded in your final sample. Indicate if each of the following special (vulnerable/protected) populations is included or excluded:

- Minors (under 18)
- Adults who are unable to consent (impaired decision-making capacity)
- Prisoners
- Economically or educationally disadvantaged individuals
- Pregnant Women

4.2 Describe how individuals will be screened for eligibility.

4.3 If not obvious, what is the rationale for the exclusion of special populations?

4.3 What procedures will be used to determine inclusion/exclusion of special populations?

TIPS for streamlining the review time.

- ✓ Research involving only data analysis should only describe what is included in the dataset proposed for use.
- ✓ For any research which includes or may likely include children/minors or adults unable to consent guidance is available at: https://researchintegrity.asu.edu/human-subjects/special-considerations
- ✓ For research targeting Native Americans or populations with a high Native American demographic, or on or near tribal lands additional guidance is available at https://public.azregents.edu/Policy%20Manual/1-118-Tribal%20Consultation.pdf
- ✓ Additional information for research involving minors on campus is available at: https://cfo.asu.edu/minors-campus

Response:

The study will include current Arizona WIC Program in all 19 local agencies throughout the state of Arizona. The study will use data rendered by the HANDS system used to track benefit redemption. Only child categories for ages 2-4 and Woman categories (Postpartum, Pregnant 1, Pregnant 2, Entirely Nursing, Partially Nursing, Partially Nursing+).

The infant categories (IFF, IEN, IPN, PN+), Child 1 year old will be excluded from the study as they are not eligible to receive 2% milk based on preference.

Individuals will be screen for eligibility by completing the benefit redemption by category report in HANDS

IRB: 5. Number of Participants

5.1 Indicate the total number of individuals you expect to recruit and enroll.

5.2 For secondary data analyses, the response should reflect the number of cases in the dataset.

Response:

The study will aim to include the average monthly participation of the above categories mentioned ~75,000 participants

IRB: 6. Recruitment Methods

6.1 Identify who will be doing the recruitment and consenting of participants.
6.2 Identify when, where, and how potential participants will be identified, recruited, and consented.
6.3 Name materials that will be used (e.g., recruitment materials such as emails, flyers, advertisements, etc.) Upload each recruitment material as a separate document. Name the document with the current date: name of the recruitment material_dd-mm-yyyy
6.4 Describe the procedures relevant to using materials (e.g., consent form).

Response:

Ivan Zacarias, the research lead, will be completing recruitment of all local agencies WIC directors to participate in this study. Agencies participating in the study will be provided with a FAQ form that will provide background on issuance of the 2% milk-based on preference. Additionally, the local agencies will be provided with a PowerPoint to utilize as additional training for staff and will be allowed to develop their own training as well. A consent form will be completed by all staff participating in the study. Recruitment of participants will not require consent as only aggregated data will be used. The local agency WIC Directors will receive guidance with the FAQ and PowerPoint on 11/09/20 with expected delivery of the FAQ and additional training through use of the power point provided or any locally developed training by the end of the November 2020.

IRB: 7. Study Timelines

Describe
7.1 The duration of an individual participant's participation in the study (including any follow up).
7.2 The duration anticipated to enroll all study participants.
7.3 The estimated date for the investigators to complete this study (up to and including primary analyses).

Response:

Redemption of food categories at three time points

b. Redemption 3 months prior to policy introduction (Mar-May 2020)
c. Redemption after policy introduction (Jul – Sept 2020)
d. Redemption after policy clarification (Dec 2020 – Feb 2021)

The WIC Directors and local agency staff will receive the follow up survey in February 2021

The primary analyses is expected to be completed by June 2021

IRB: 8. Procedures Involved

8.1 Describe and explain the study design. Describe procedures including:
8.2 The documents/ measures / devices/ records /sampling that will be used to collect data about participants. (Attach all surveys, scripts, and data collection forms.)
8.3 What data will be collected including long-term follow-up?
8.4 All drugs and medical devices used in the research and the purpose of their use, and their regulatory approval status.
8.5 Describe any costs that participants may be responsible for because of participation in the research. (travel or parking costs for example, and explain any reimbursement procedures.)
8.6 For each procedure listed, describe **who** will be conducting it, **where** it will be performed, **how long** is participation in each procedure, and **what data** will be collected in each procedure.
8.7 For **secondary data analyses**, identify if it is a public dataset (please include a weblink where the data will be accessed from, if applicable). If not, describe the contents of the dataset, how it will be accessed, and attach data use agreement(s) if relevant.

TIPS for streamlining the review time.

- ✓ For studies with multiple procedures the IRB recommends including a table enumerating the name of the measures, corresponding citation (if any), number of items, sources of data, time/wave if a repeated measures design.
- ✓ Provide intervention materials, session outlines, or any other supplemental material that will be involved in the research process**.**
- ✓ **Upload all the materials relevant to this section. Name the document: supporting documents dd-mm-yyyy**

Response: The study design will be a cross sectional retrospective study. Data will be obtained by pulling reports through the Arizona WIC Program system (HANDS) for all 19 local agencies. One agency will be the control and will not receive the clarification or training. WIC participants will be blind to the study. Data will be collected through HANDS by ADHS and analyzed by Ivan Zacarias. The survey will be delivered via Survey Monkey in February 2021 and analyzed by Ivan Zacarias in March 2021. No additional follow up to staff, directors or participants will be completed. This study will not have any associated cost to the staff, directors or participants.

IRB: 9. Compensation

9.1 Report the amount and timing of any compensation or credit to participants.
9.2 Identify the source of the funds to compensate participants.
9.3 Justify that the compensation to participants is reasonable and/or how the compensation amount was determined.
9.4 Describe the procedures for distributing the compensation or assigning the credit to participants.

TIPS for streamlining the review time.

- ✓ If partial compensation or credit will be given or if completion of all elements is required, explain the rationale or a plan to avoid coercion
- ✓ For extra or course credit guidance, see "Research on educational programs or in classrooms" on the following page: https://researchintegrity.asu.edu/human-subjects/special-considerations.
- ✓ For compensation over $100.00, review "Research Subject Compensation" at: https://researchintegrity.asu.edu/human-subjects/special-considerations for more information.

Response:
This study will not provide compensation to participants

IRB: 10. Withdrawal of Participants

10.1 List anticipated circumstances under which participants will be withdrawn from the research without their consent.
10.2 Describe procedures that will be followed when participants withdraw from the research, including partial withdrawal from procedures with continued data collection.

Response:
There is no anticipated circumstance that participants will be withdrawn from the study. The reports from which data will be pulled will reflect only those participants who received and redeemed benefits for the indicated by the study.

IRB: 11. Risks to Participants

11.1 List the reasonably foreseeable risks, discomforts, hazards, or inconveniences to the participants related the participants' participation in the research. Include as may be useful for the IRB's consideration, the probability, magnitude, duration, and reversibility of the risks. Consider physical, psychological, social, legal, and economic risks. Reference this information when appropriate.

11.2 If applicable, indicate which procedures may have risks to an embryo or fetus should the participant be or become pregnant.

11.3 If applicable, describe risks to others who are not subjects.

11.4 If there are risks, clearly describe the plan for mitigating the identified risks.

Safety Monitoring

This is required when research involves more than Minimal Risk to participants. The plan might include establishing a data monitoring committee and a plan for reporting data monitoring committee findings to the IRB and the sponsor. Describe:

11.5 The plan to periodically evaluate the data collected regarding both harms and benefits to determine whether participants remain safe.

11.6 What data are reviewed, including safety data, untoward events, and efficacy data?

11.7 How the safety information will be collected (e.g., with case report forms, at study visits, by telephone calls with participants).

11.8 Who will review the data?

Response: There are not foreseeable risk, hazards, discomforts or inconveniences to the WIC participant.

WIC staff will not have any risk, hazards, discomforts but may perceive in inconvenience in receiving additional training.

WIC Directors may have a perceived inconvenience in providing training. The WIC director for the control group may perceive a loss of education.

IRB: 12. Potential Direct Benefits to Participants

12.1 List the potential direct benefits to research participants. If there are risks noted in 11 (above), articulated benefits should outweigh such risks. These benefits are not to society or others not considered participants in the proposed research. Indicate if there is no direct benefit.

12.2 A direct benefit comes as a direct result of the subject's participation in the research. An indirect benefit may be incidental to the subject's participation. Do not include compensation as a benefit.

12**.3 Include the probability, magnitude, and duration of the potential benefits.**

Response:

WIC participants will benefit from having an additional option for the milk benefit that better meets their preference.

WIC staff will have the benefit of being able to offer an additional option to their participants

WIC directors will have the benefit of meeting annual training requirements by providing this training

IRB: 13. Site(s) or locations where research will be conducted

List the sites or locations where your research team will conduct the research.

13.1 Identify where research procedures will be performed.13.2 For research conducted outside of the ASU describe:

- Site-specific regulations or customs affecting the research.
- Local scientific and ethical review structures in place.

13.2 For research conducted with secondary data (archived data):

- List what data will be collected and from where.
- Describe whether or not the data requires a Data Use Agreement or any other contracts/agreements to access it for research purposes.

13.3 If this is a **multi-site study** where you are the lead investigator, describe the processes you will use to ensure communication among sites, such as:

- Each site has the most current version of the protocol, consent document, and HIPAA authorization.
- Required approvals have been obtained at each site (including approval by the site's IRB of record).
- Describe processes you will use to communicate with participating sites.
- Participating sites will safeguard data as required by local information security policies.

Response:

All research will be completed remotely using HANDS, pre-recorded presentation for the powepoint and electronic copy of the FAQ. Surveys will be delivered electronically to all staff and WIC directors

IRB: 14. Resources Available

Describe the qualifications (e.g., training, experience, oversight) of you and your staff as required to perform your roles. When applicable describe knowledge of the local study sites, culture, and society. Provide enough information to convince the IRB that you have qualified staff for the proposed research.

Describe other resources available to conduct the research:

For example, as appropriate:

14.1 Describe your facilities.

14.2 Describe the availability of medical or psychological resources that participants might need as a result of any anticipated consequences of the human research. These should reflect the risks identified above.

14.3 Describe your process to ensure that all persons assisting with the research are adequately informed about the protocol, the research procedures, and their duties and functions.

Response:

Ivan Zacarias has been with the WIC program for seven years and is a Registered Dietitian Nutritionist, International Board Certified Lactation Consultant. He is currently working at ADHS as WIC Nutrition Consultant but has worked at the clinic level for 6 years.

Taffery Lowry will be providing assistance for any technical support needed in completed data retrieval from the HANDS system. She is currently the ADHS Chief for the Office of Vendor and Project Management and has extensive experience with the HANDS System

Devina Wadhera is the Bureau of Nutrition and Physical Activity Program Manager-Evaluator and has extensive knowledge on data interpretation.

Meg Bruening has worked with previous masters students and will provide mentorship through the life of the study.

IRB: 15. Prior Approvals

15.1 Describe any approvals that will be obtained prior to commencing the research. (E.g., school, external site, funding agency, laboratory, radiation safety, or biosafety approval.)

15.2 In some circumstances, the external organization may require ASU's IRB approval prior to granting approval to the research team. If this is the case, explain in the protocol, and include language that approval will be added via modification prior to research proceeding.

Response:

Prior approval has been obtain for a data shard agreement between ASU and ADHS

IRB: 16. Data Management and Confidentiality

16.1 Indicate steps that will be taken to protect participant's privacy

16.2 Describe the steps that will be taken to **secure** the data during storage, use, and transmission.
(Training, authorization of access, password protection, encryption, physical controls, certificates of confidentiality, and separation of identifiers and data collected)

16.3 Describe how data and any specimens will be handled:

- What **personal identifiers** will be included in that data or associated with the specimens?
- Describe how any data will be **de-identified**, linked or tracked (e.g. master-list, contact list, reproducible participant ID, randomized ID, etc.). Outline the specific procedures and processes that will be followed.
- **Where and how** data or specimens will be **stored**?
- **How long** the data or specimens will be stored?
- Who will have **access** to the data or specimens?
- Who is responsible for receipt or transmission of the data or specimens?
- How will data and specimens be **transported**?
- If data or specimens will be banked for **future use**, describe where the specimens will be stored, how long they will be stored, how the specimens will be accessed, and who will have access to the specimens.
- Describe the procedures to **release data or specimens**, including: the process to request a release, approvals required for release, who can obtain data or specimens, and the data to be provided with specimens.
- **For studies accessing existing data sets, clearly describe whether or not the data requires a Data Use Agreement/ Business Associate Agreement or any other contracts/agreements to access it for research purposes.**

Response:

Data that will be obtain for the study will only be aggregate data. WIC staff are training on HIPPA and maintain client confidentiality agreements. Names of staff and directors will not be included in surveys to keep responses anonymous. Per WIC policy all data will be stored for a minimum of 5 years and 5 months. Storage of data will competed through ADHS secure network. The following individuals will have access to the data: Ivan Zacarias, Devina Wadhera, Taffery Lowry and Meg Bruening. Only aggregate data is permitted to be released by ADHS with written approval.

IRB: 17. Consent Process

Describe the process and procedures you will use to obtain consent. Include a description of:

17.1 Who will be responsible for consenting participants?
17.2 Where will the consent process take place?
17.3 How will the consent be obtained (e.g., verbal, digital signature)?

TIPS for streamlining the review time.

- ✓ If participants who do not speak English will be enrolled, describe the process to ensure that the oral and/or written information provided to those participants will be in their preferred language. Indicate the language that will be used by those obtaining consent. For translation requirements, see Special Considerations: Translating documents and materials under https://researchintegrity.asu.edu/human-subjects/protocol-submission. Note that in addition to translated materials submitted as part of the modification, the research team will need to upload the completed back translation certificate form or documentation of professional translation.

- ✓ Translated consent forms should be submitted after the English is version of all relevant materials are approved.
- ✓ If a waiver for the informed consent process is requested, justify the waiver in terms of each of the following: (a) The research involves no more than minimal risk to the subjects; (b) The waiver or alteration will not adversely affect the rights and welfare of the subjects; (c) The research could not practicably be carried out without the waiver or alteration; and (d) Whenever appropriate, the subjects will be provided with additional pertinent information after participation.
- ✓ ASU consent templates are [here].
- ✓ **Consents and related materials need to be congruent with the content of the application.**

Response:

Consent forms will be provided to all staff members by directors. Follow up in November 2020 will be completed by Ivan Zacarias to ensure that all staff have completed their consent forms.

IRB: 18. Investigational New Drug or Devices

If the drug is investigational (has an IND) or the device has an IDE or a claim of abbreviated IDE (non-significant risk device), include the following information:

9 19.1 Identify the hold of the IND/IDE/Abbreviated IDE.

10 19.2 Explain procedures followed to comply with FDA sponsor requirements for the following:

	Applicable to:		
FDA Regulation	**IND Studies**	**IDE studies**	**Abbreviated IDE studies**
21 CFR 11	X	X	
21 CFR 54	X	X	
21 CFR 210	X		
21 CFR 211	X		
21 CFR 312	X		
21 CFR 812		X	X
21 CFR 820		X	

Resource: https://oprs.usc.edu/files/2017/05/IND-IDE-4-1-13.pdf

Response:
Not applicable

IRB: 19. Human Subjects Certification from Training.

19.1 Provide the names of the members of the research team.

Note: ASU affiliated individuals do not need attach Certificates. Non-ASU investigators and research team members anticipated to manage data and/or interact with participants, need to provide the most recent CITI training for human participants available at www.citiprogram.org. Certificates are valid for 4 years.

TIPS for streamlining the review time.

- ✓ If any of the study team members have not completed training through ASU's CITI training (i.e. they completed training at another university), copies of their completion reports will need to be uploaded when you submit.
- ✓ For any team members who are affiliated with another institution, please see "Collaborating with other institutions" [here]
- ✓ The IRB will verify that team members have completed IRB training. Details on how to complete IRB CITI training through ASU are [here]

Response:
Ivan Zacarias
Meg Bruening
Devina Wadhera
Taffery Lowry

General Tips:

- Have all members of the research team complete IRB training before submitting.
- Keep things simple and clear. A submission shouldn't require any guesswork or require outside information by the reviewers.
- Ensure that all your instruments, recruitment materials, study instruments, and consent forms are submitted via ERA when you submit your protocol document. For recommended templates, see https://researchintegrity.asu.edu/human-subjects/forms
- Submit a complete protocol. Don't ask questions in the protocol – submit with your best option and, if not appropriate, revisions will be requested.
- If your study has undeveloped phases, clearly indicate in the protocol document that the details and materials for those phases will be submitted via a modification when ready.
- Review all materials for consistency. Ensure that the procedures, lengths of participation, dates, etc., are consistent across all the materials you submit for review.
- Only ASU faculty, full time staff may serve as the PI. Students may prepare the submission by listing the faculty member as the PI. The submit button will only be visible to the PI.
- For information on how and what to submit with your study in ERA, see https://researchintegrity.asu.edu/human-subjects/protocol-submission. Note that if you are a student, you will need to have your Principal Investigator submit.

ASU Knowledge Enterprise Development

EXEMPTION GRANTED

Meredith Bruening
Nutrition
602/827-2266
Meg.Bruening@asu.edu

Dear Meredith Bruening:

On 11/24/2020 the ASU IRB reviewed the following protocol:

Type of Review:	Modification / Update
Title:	Changes in milk issuance on WIC food package redemption in women and 2-4-year-old children.
Investigator:	Meredith Bruening
IRB ID:	STUDY00012631
Funding:	None
Grant Title:	None
Grant ID:	None
Documents Reviewed:	• 2% Milk Issaunce - Final.pdf, Category: Technical materials/diagrams; • Consent Draft 11.16 Final.pdf, Category: Consent Form; • FAQ_Final.pdf, Category: Technical materials/diagrams; • Local Agency Staff Survey_11242020.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions); • WIC Director Survey_clean11242020.pdf, Category: Measures (Survey questions/Interview questions /interview guides/focus group questions);

The IRB determined that the protocol is considered exempt pursuant to Federal Regulations 45CFR46 (2) Tests, surveys, interviews, or observation, (4) Data, documents, or specimens on 11/24/2020.

APPENDIX B

CONSENT FORM

I am a graduate student under the direction of Professor Meg Bruening in the College of Health Solutions at Arizona State University, and also a WIC employee. I am conducting a research study to assess the **Arizona WIC food package and how change in policy is communicated.**

I am inviting your participation to complete a survey that will take **no more than 5 minutes of your time.** There will not be a required training or performance outside of your normal role. You have the right not to answer any question, and to stop participation at any time.

Your participation in this study is voluntary. If you choose not to participate or to withdraw from the study at any time, there will be no penalty, for example it will not affect your annual performance evaluation.

Your participation in this study will be used to improve the Arizona WIC program while improving overall program customer service. There are no foreseeable risks or discomforts to your participation.

Survey and feedback provided during the study will be anonymous. The results of this study may be used in reports, presentations, or publications but your name will not be used. All responses will be presented as aggregated data.

If you have any questions concerning the research study, please contact the research team at meg.bruening@asu.edu or 602.827.2266. If you have any questions about your rights as a subject/participant in this research, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788. Please let me know if you wish to be part of the study.

By clicking next, you consent to participate in the survey.

APPENDIX C

DIRECTORS SURVEY

Default Question Block

Your participation in this survey is voluntary. Your responses to this survey will not be used to measure you agency's performance or in an ME.

I am Director of WIC services for _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _
(select all that apply).

- ☐ Apache County Health Dept.
- ☐ Desert Senita Community Health Center
- ☐ Mohave County Department of Health and Social Services
- ☐ Greenlee County Health Department
- ☐ Maricopa County Department of Public Health
- ☐ El Rio Health Center
- ☐ Pima County Health Department

- [ ] Mountain Park Health Center
- [ ] Adelante Healthcare
- [ ] Pinal County Department of Public Health
- [ ] Yavapai County WIC
- [ ] Coconino County Dept of Public Health
- [ ] Navajo County Health Department
- [ ] Cochise County Health Department
- [ ] Yuma County Health Dept
- [ ] Gila County Health Department
- [ ] Graham County Department of Health
- [ ] Marana Health Center
- [ ] Mariposa WIC Program

How did you train your staff on the new 2% milk issuance policy? **(Select all that apply).**

- [ ] FAQ sheet
- [ ] PowerPoint Recording
- [ ] Local Agency-made training
- [ ] Peer
- [ ] Word of mouth
- [ ] Other (please specify):
- [ ] I did not provide this training.

How strongly do you agree or disagree with the policy of allowing 2% milk to **women and children at risk for nutritional deficiencies?**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Select one	○	○	○	○	○

APPENDIX D

STAFF SURVEY

Your participation in this survey is voluntary. Your responses to this survey will not affect your annual performance evaluation.

I work for _____local agency. Select one from below.

- ○ Apache County Health Dept.
- ○ Desert Senita Community Health Center
- ○ Mohave County Department of Health and Social Services
- ○ Greenlee County Health Department
- ○ Maricopa County Department of Public Health
- ○ El Rio Health Center
- ○ Pima County Health Department
- ○ Mountain Park Health Center
- ○ Adelante Healthcare
- ○ Pinal County Department of Public Health

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- ○ Yavapai County WIC
- ○ Coconino County Dept of Public Health
- ○ Navajo County Health Department
- ○ Cochise County Health Department
- ○ Yuma County Health Dept
- ○ Gila County Health Department
- ○ Graham County Department of Health
- ○ Marana Health Center
- ○ Mariposa WIC Program

How did you receive the 2% milk issuance training? **(Select all that apply).**

- ☐ FAQ sheet
- ☐ PowerPoint Recording
- ☐ Local Agency-made training
- ☐ Peer
- ☐ Word of mouth
- ☐ _____ Other (please specify):
- ☐ I did not get this training.

How would you rate your level of understanding of the new 2% milk policy for **women and children at risk for nutritional deficiencies?**

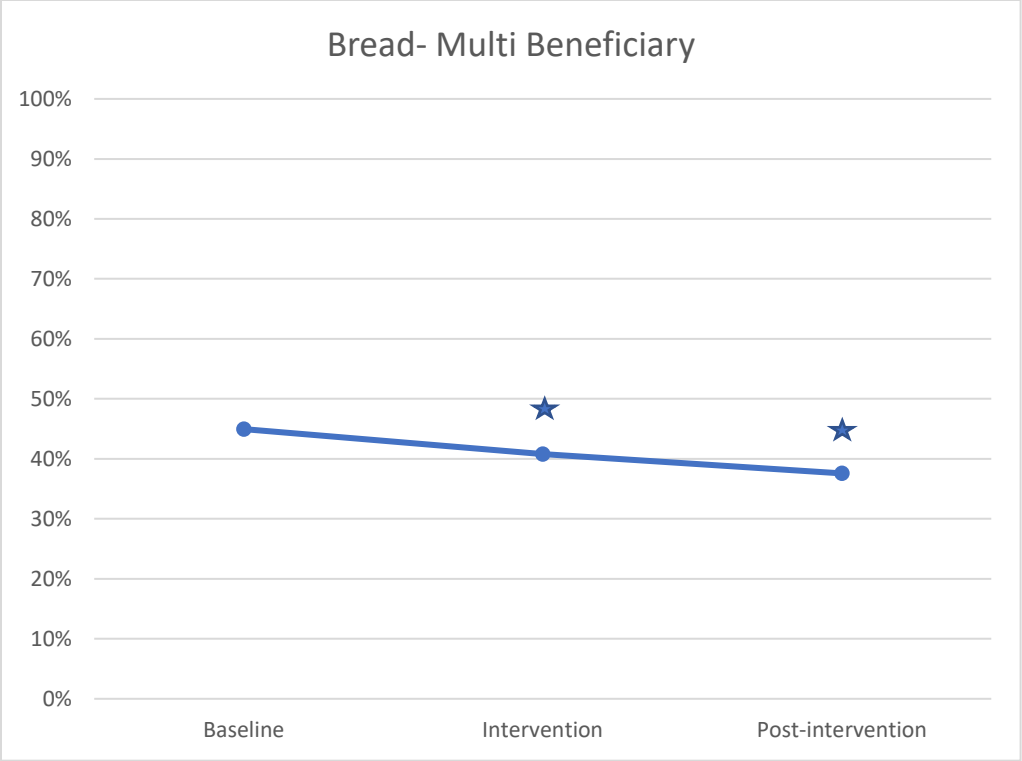
	Very Poor	Poor	Average	Good	Excellent
Select one	○	○	○	○	○

How strongly do you agree or disagree with the policy of allowing 2% milk to **women and children at risk for nutritional deficiencies?**

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Select one	○	○	○	○	○

APPENDIX E

REDEMPTION OF SUB FOOD CATEGORIES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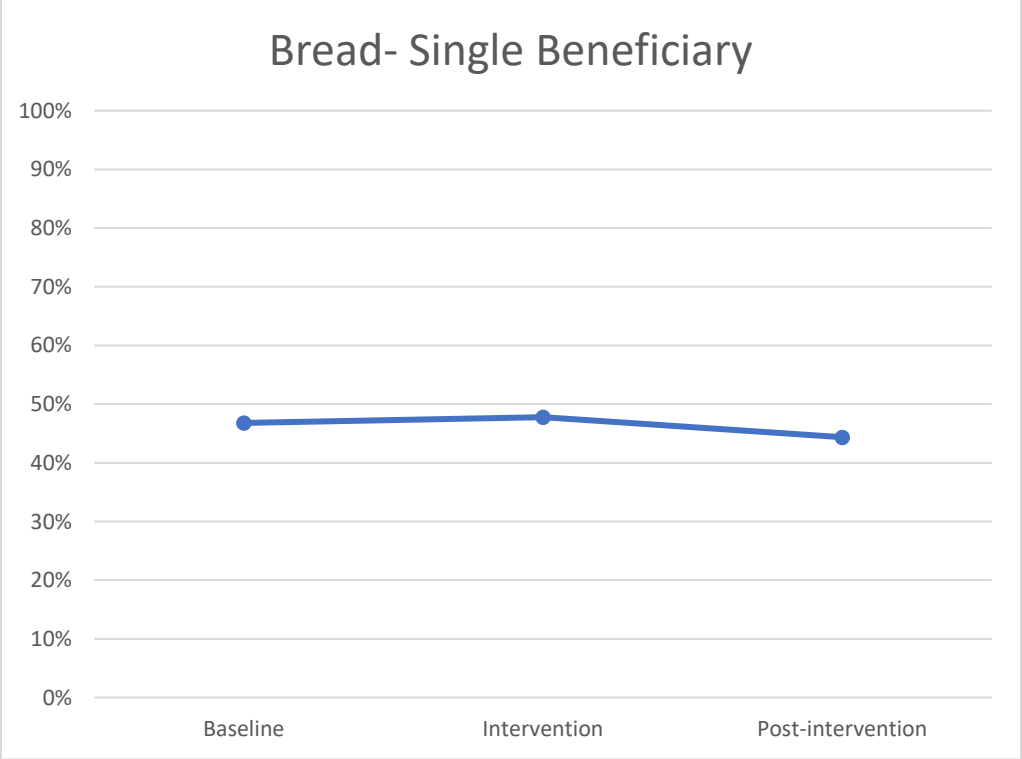
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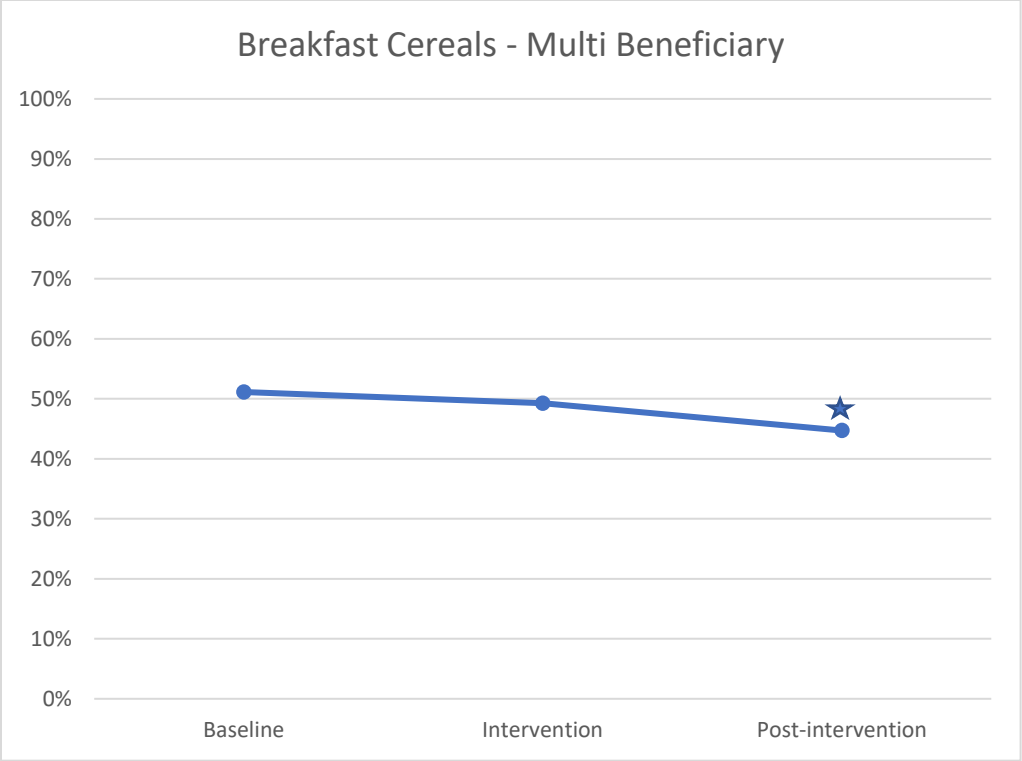
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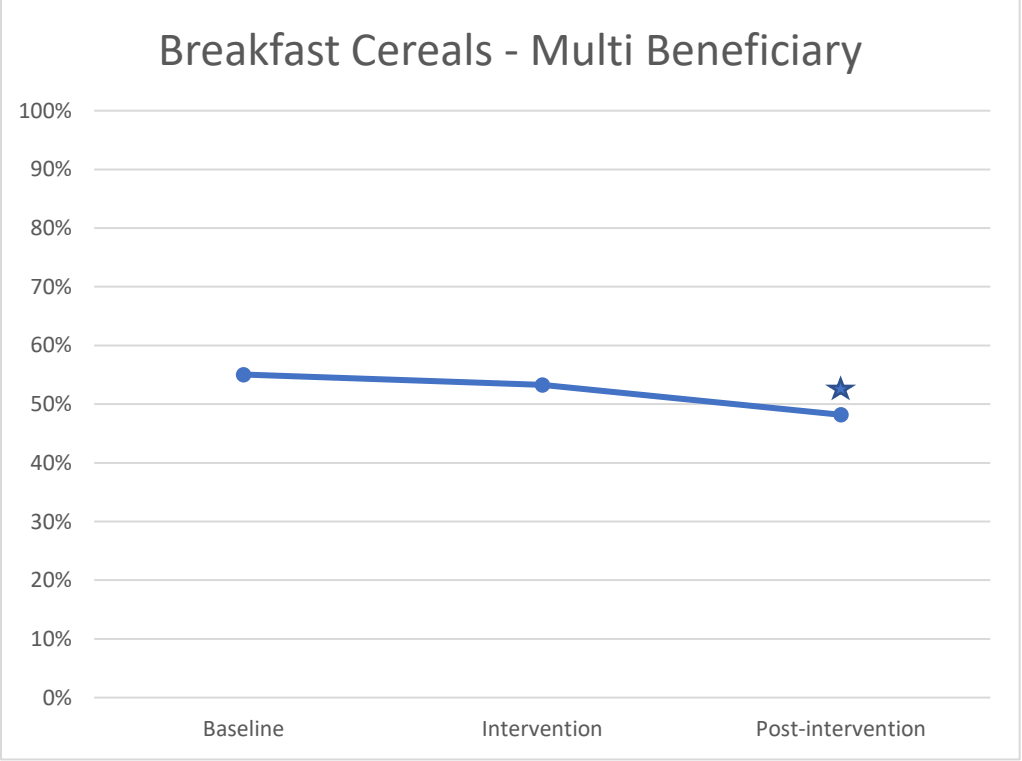
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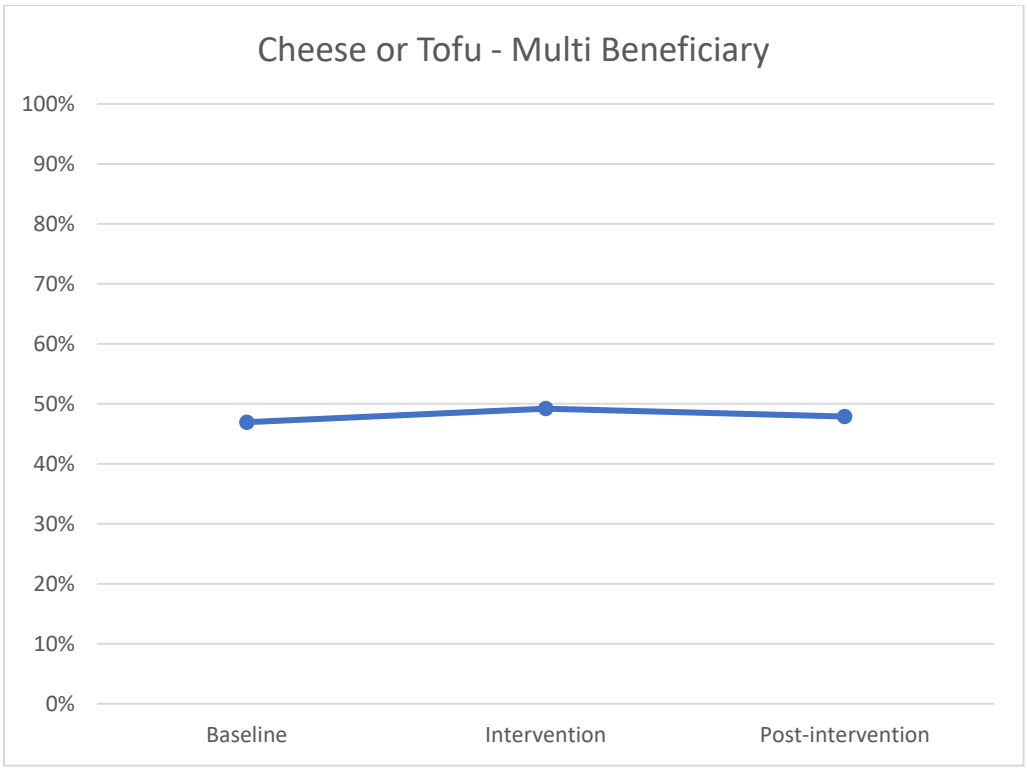
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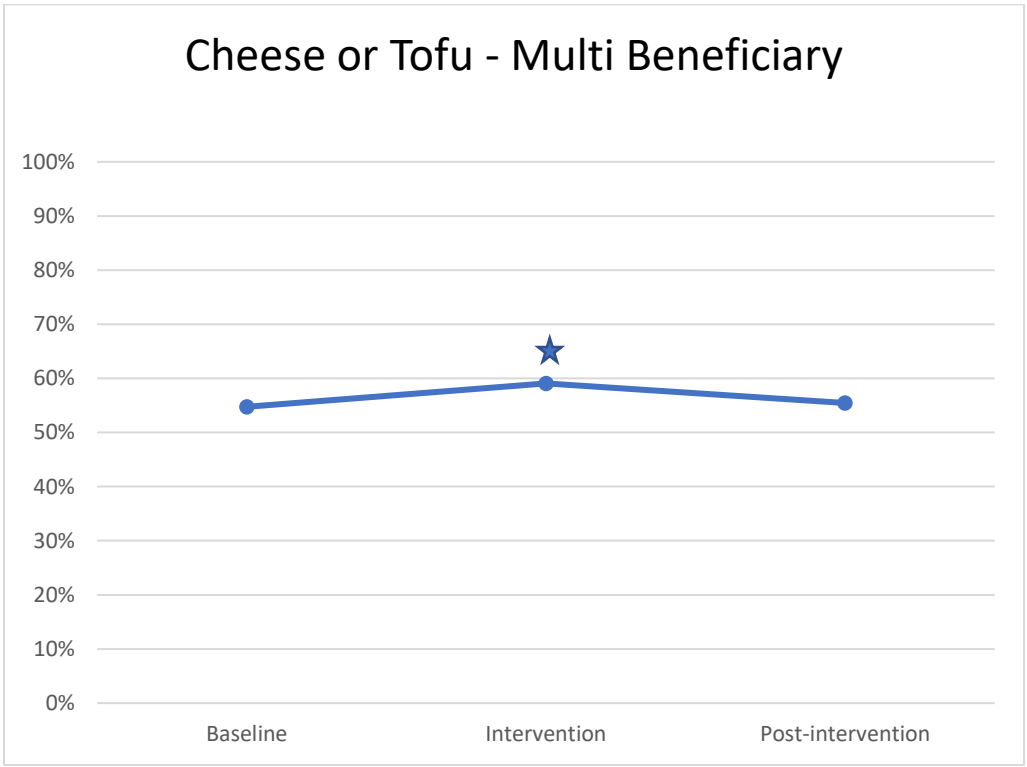
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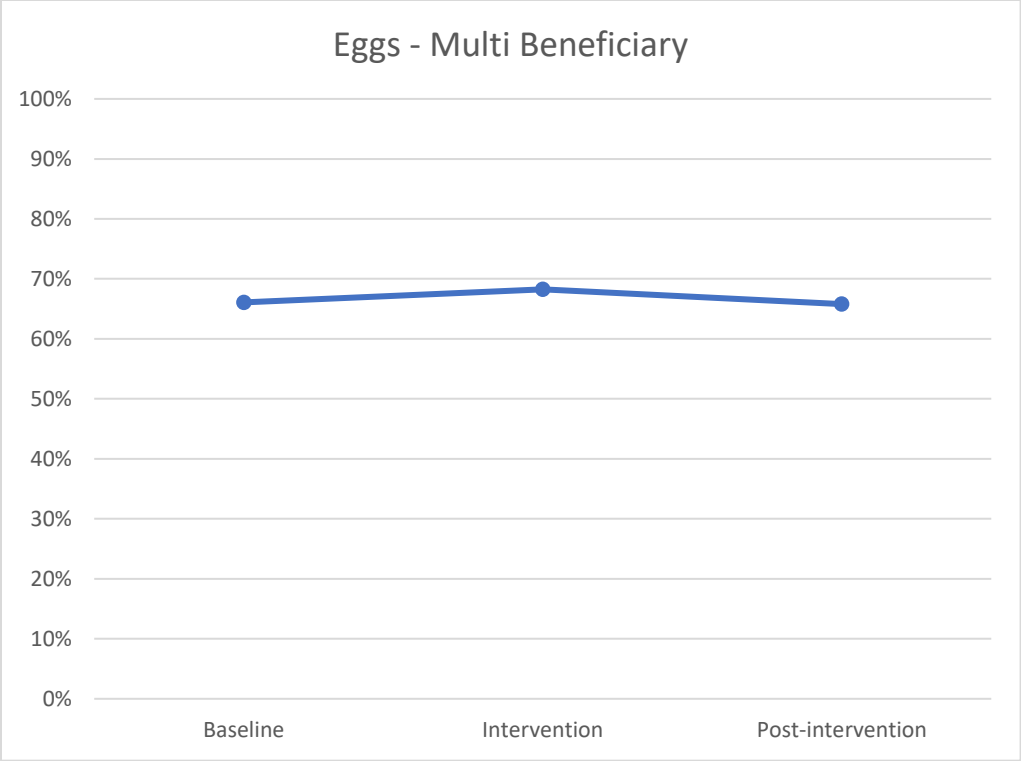
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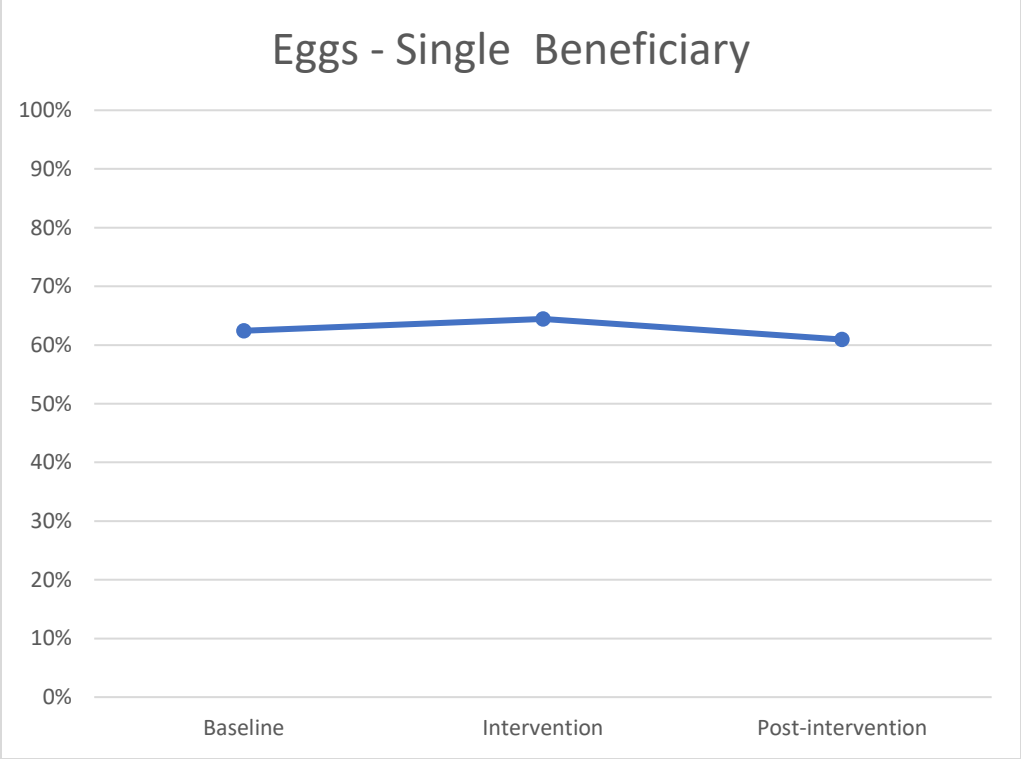
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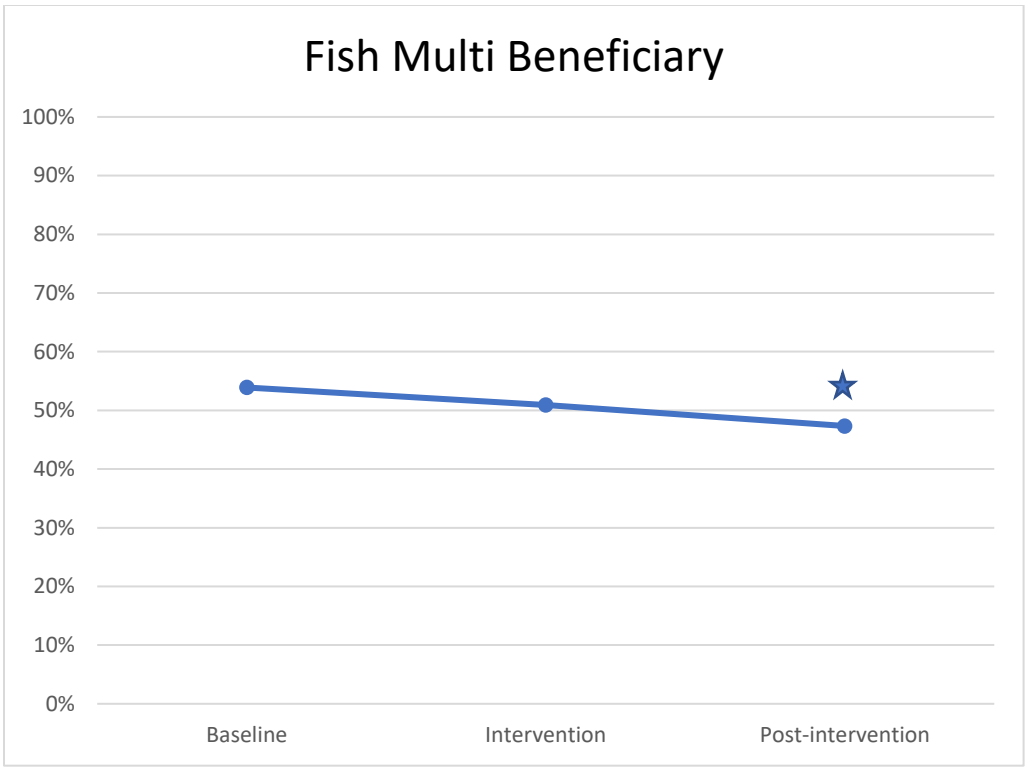
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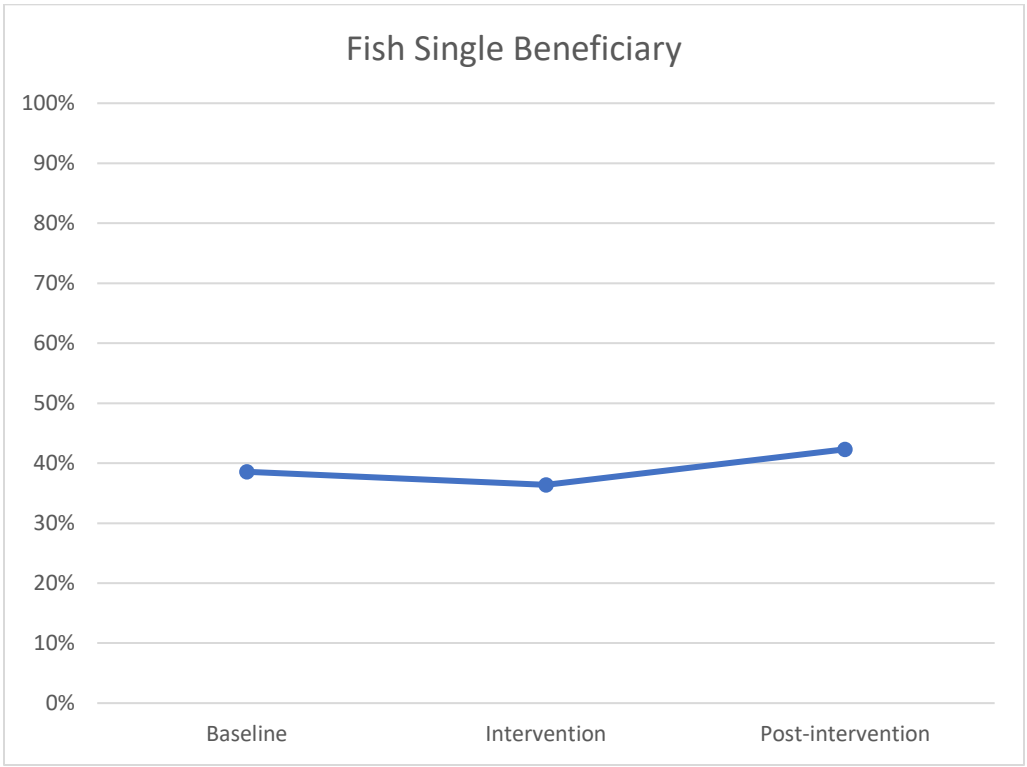
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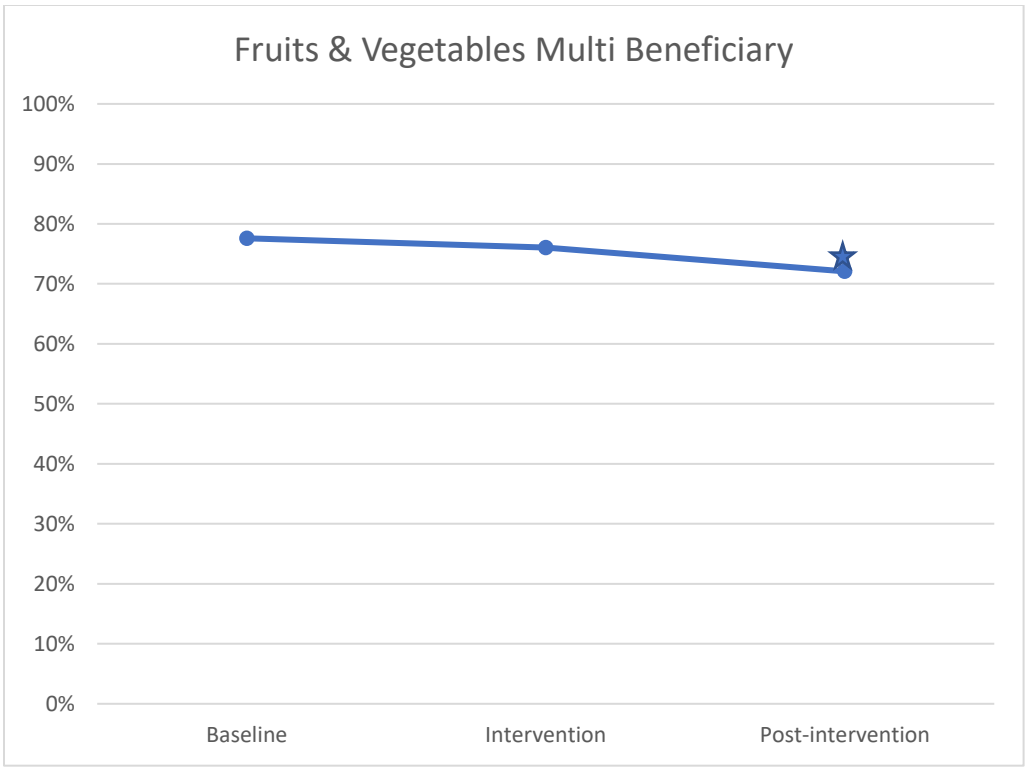
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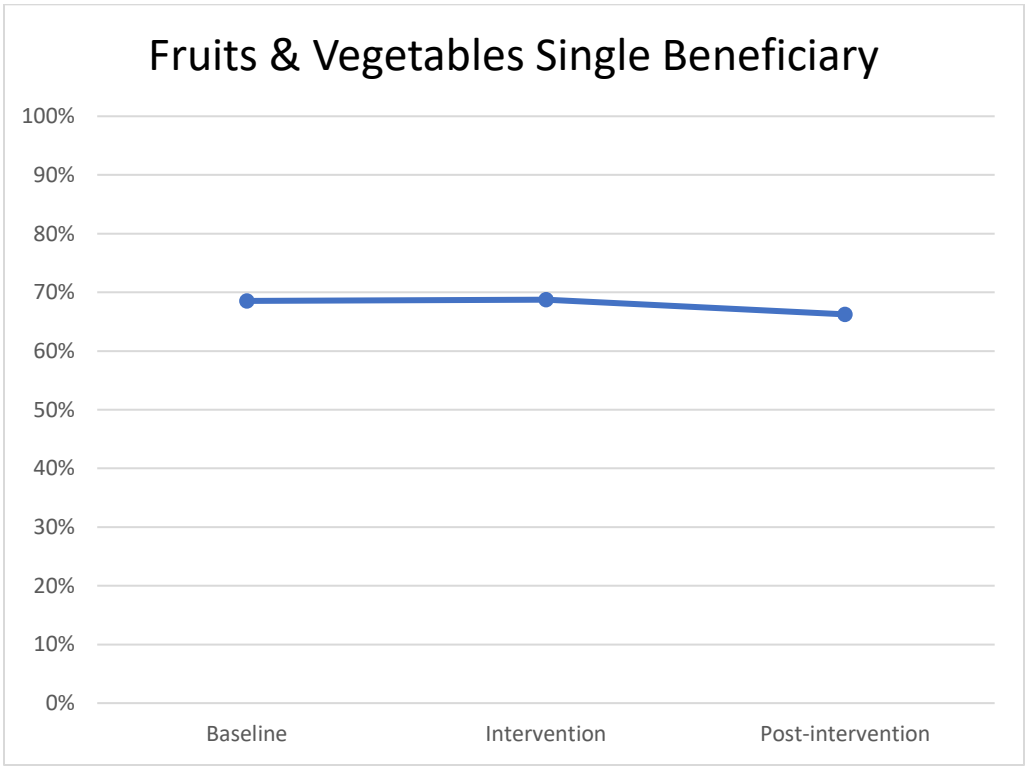
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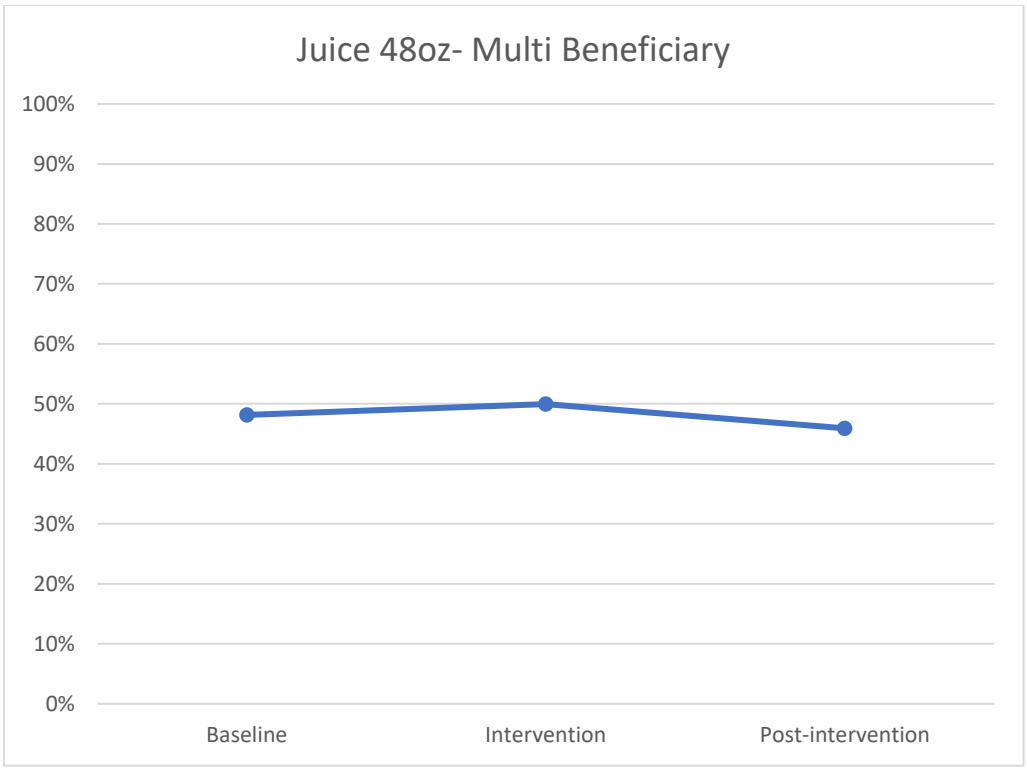
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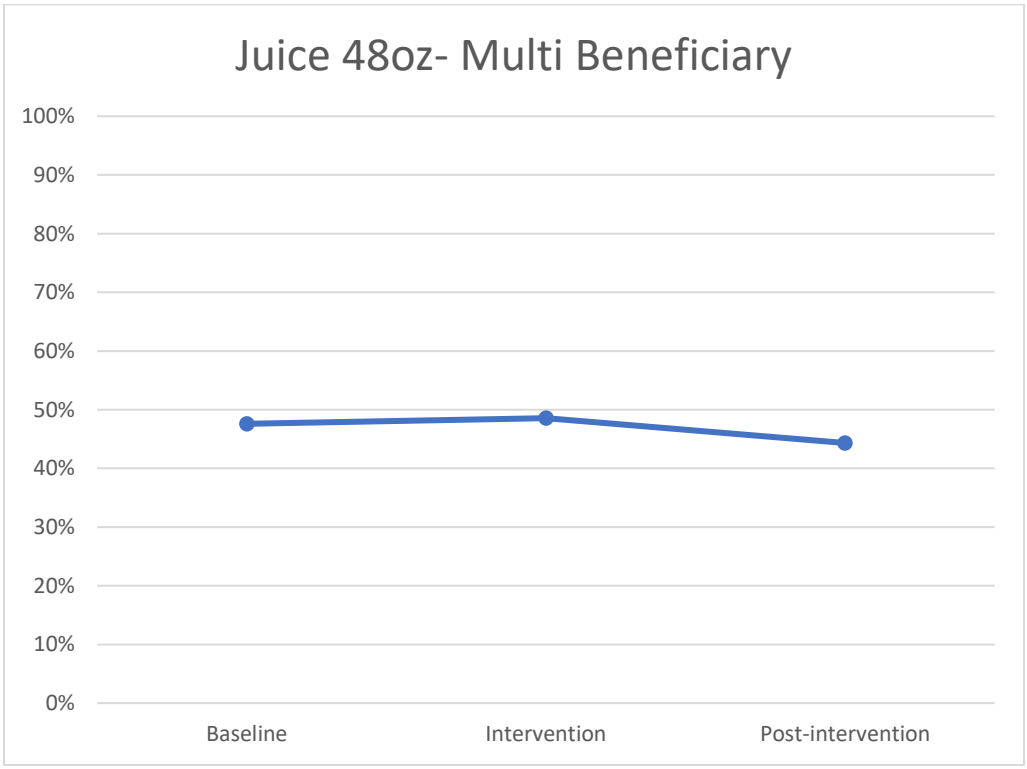
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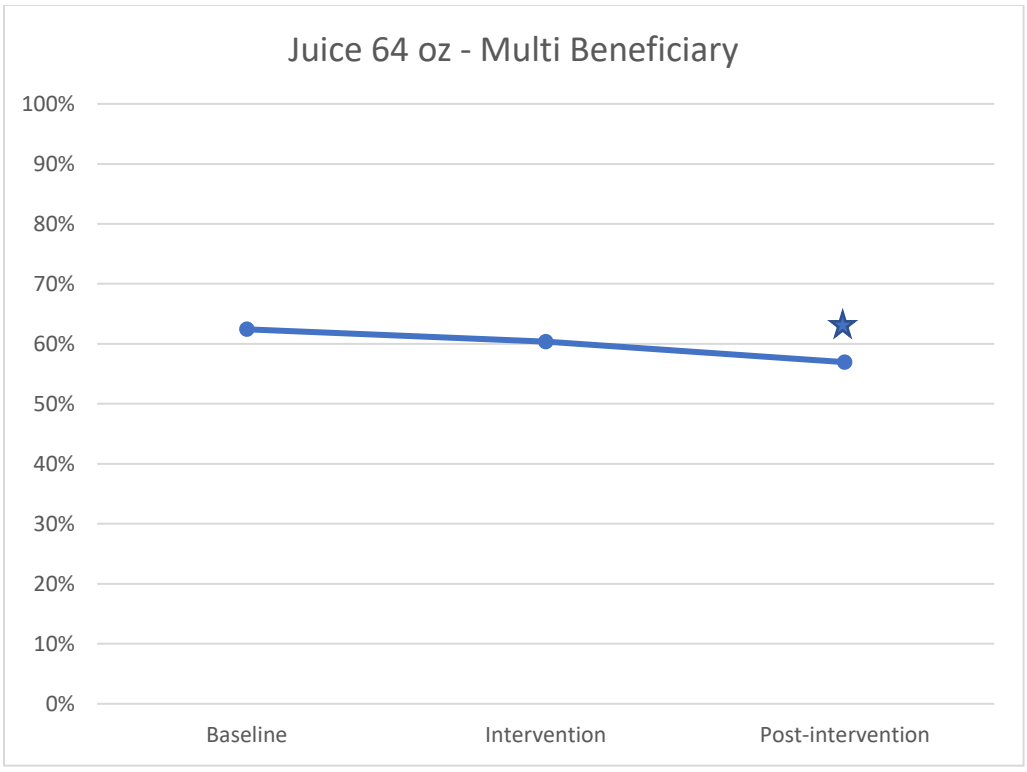
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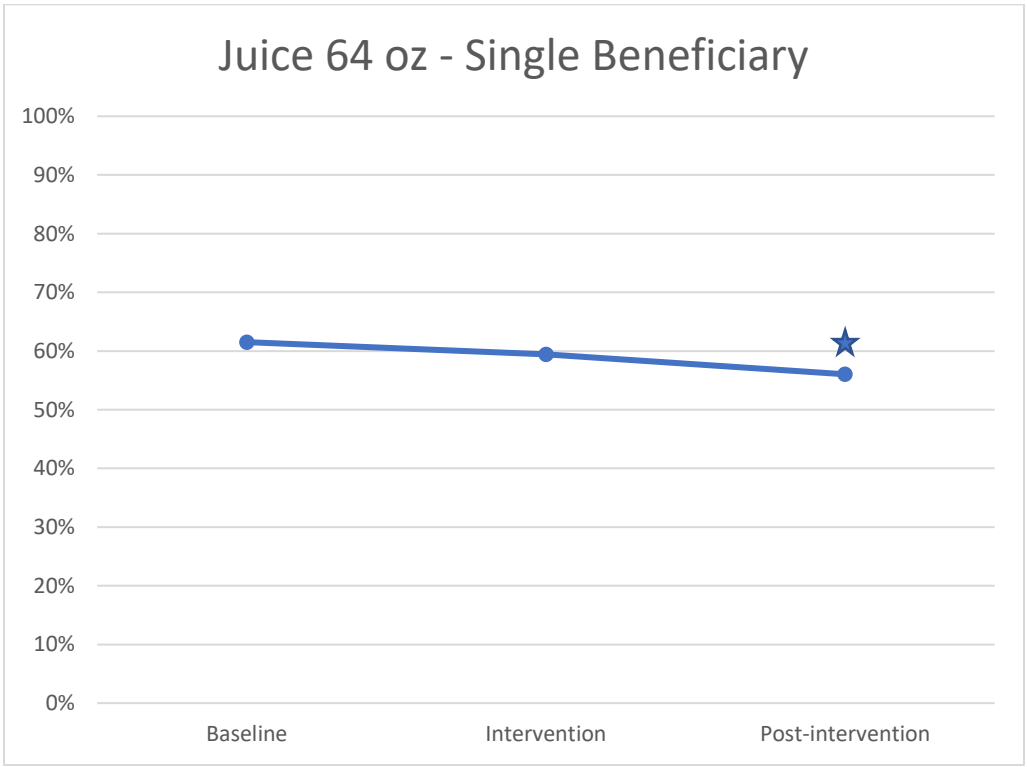
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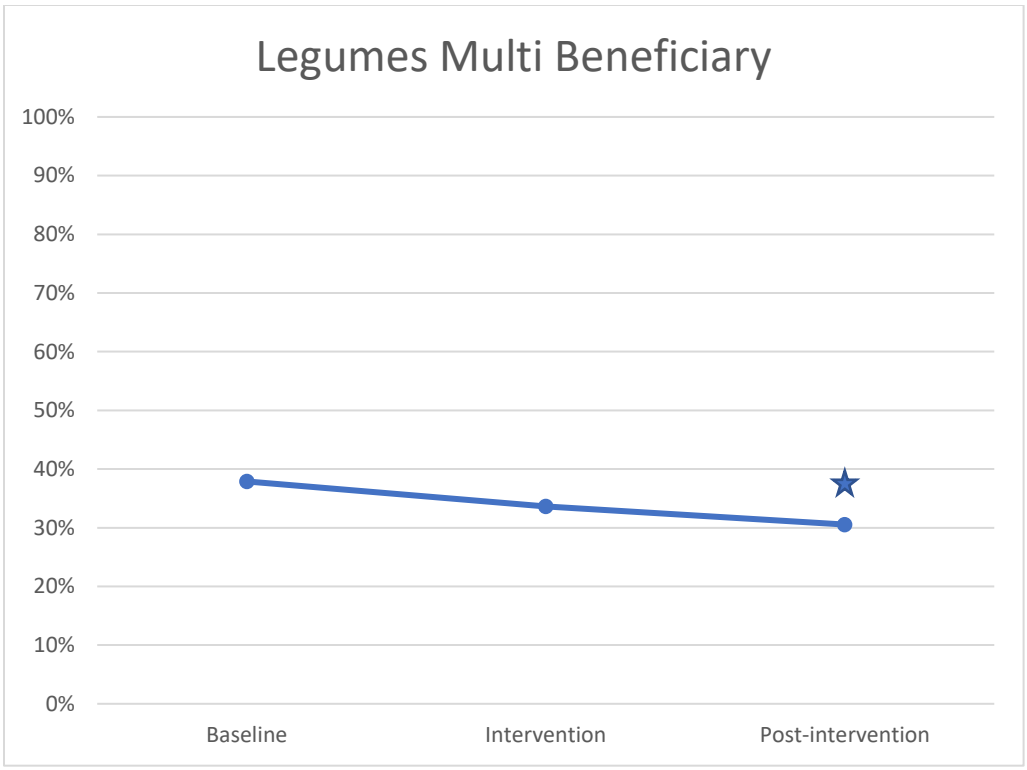
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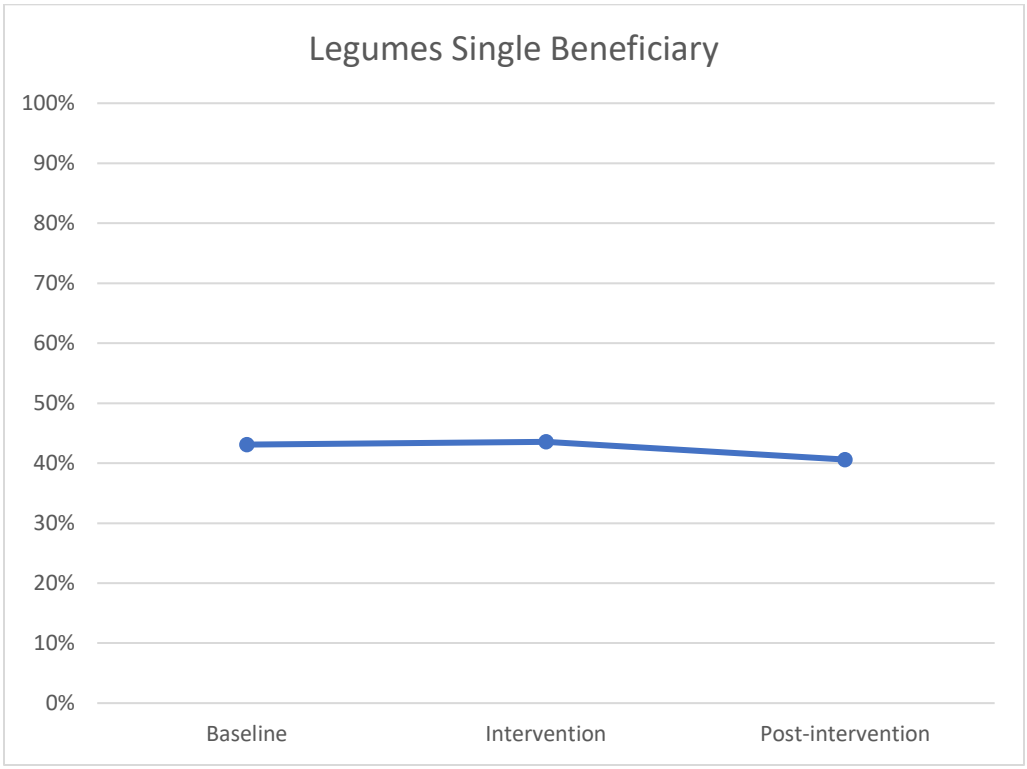
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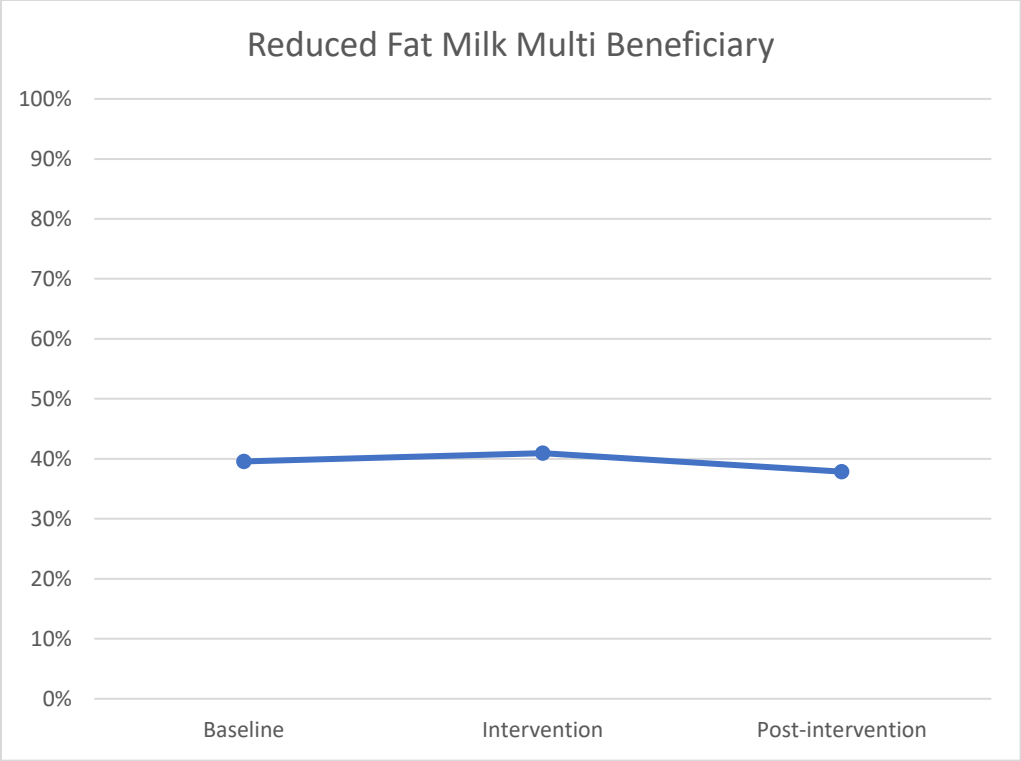
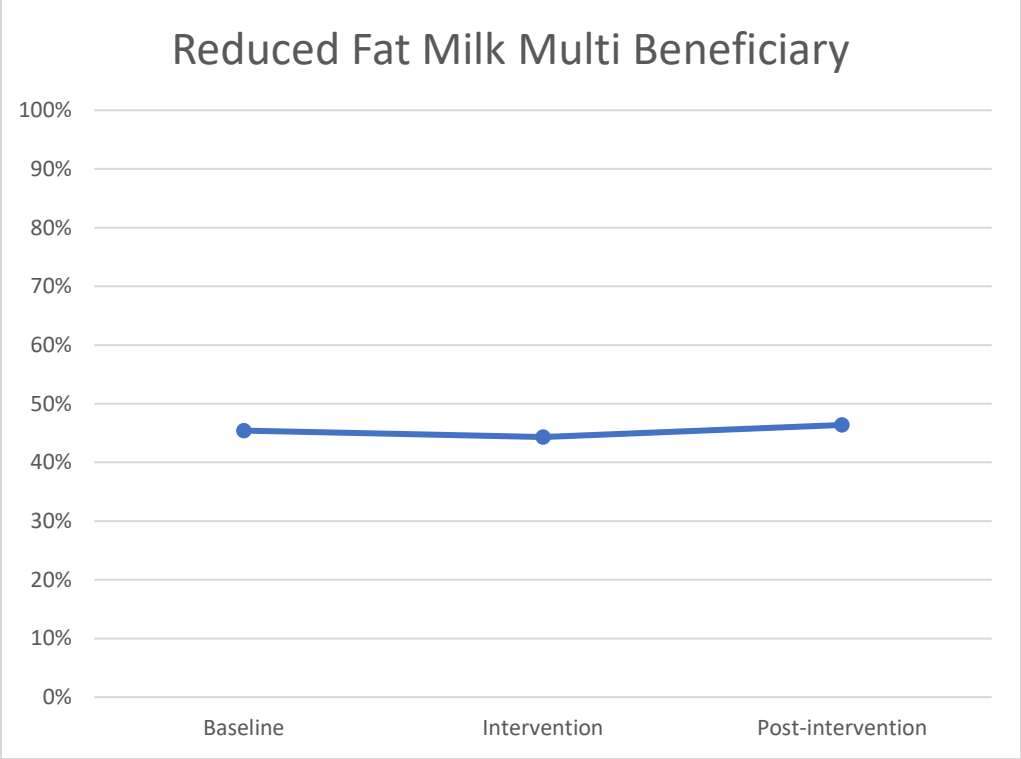
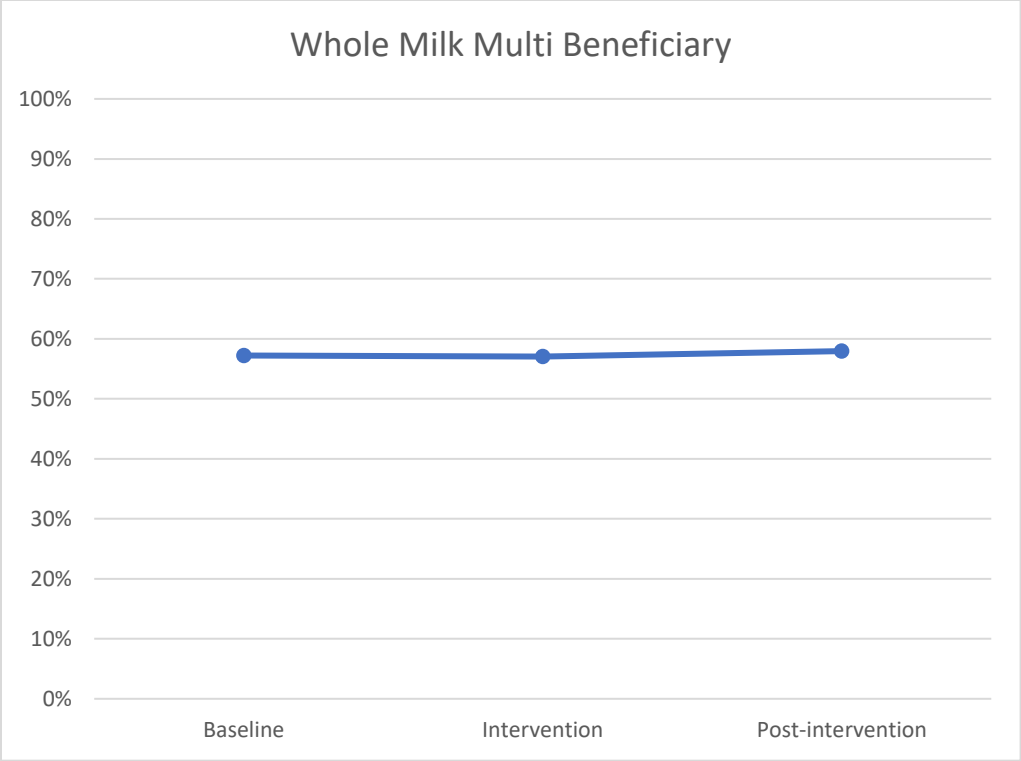
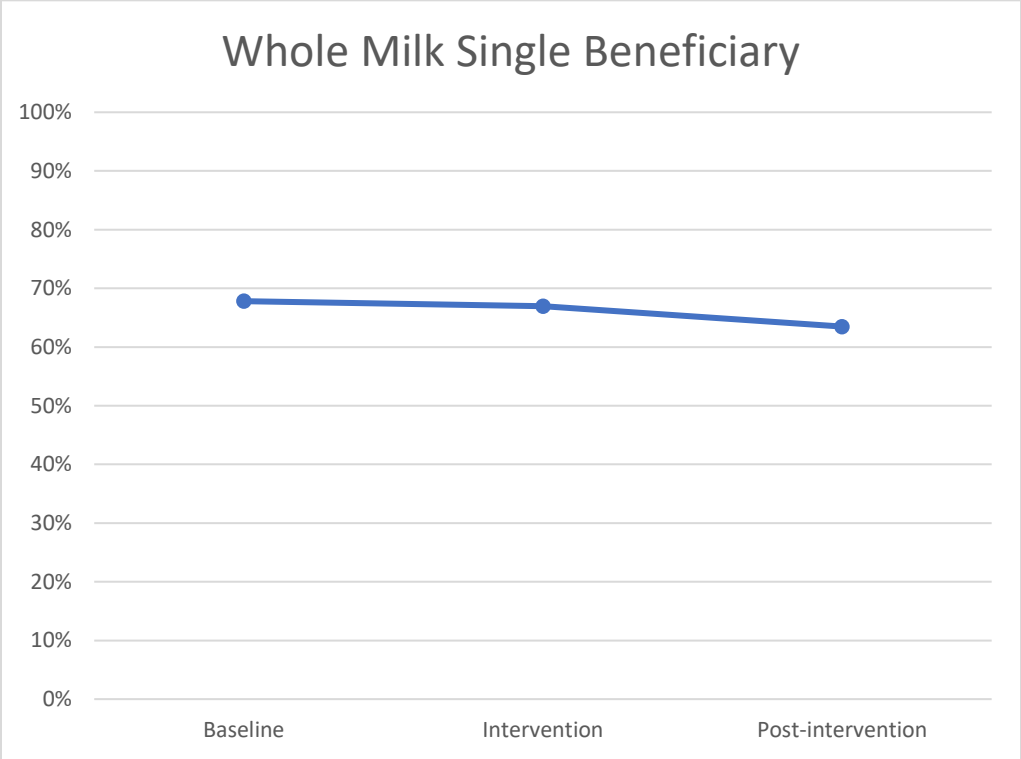
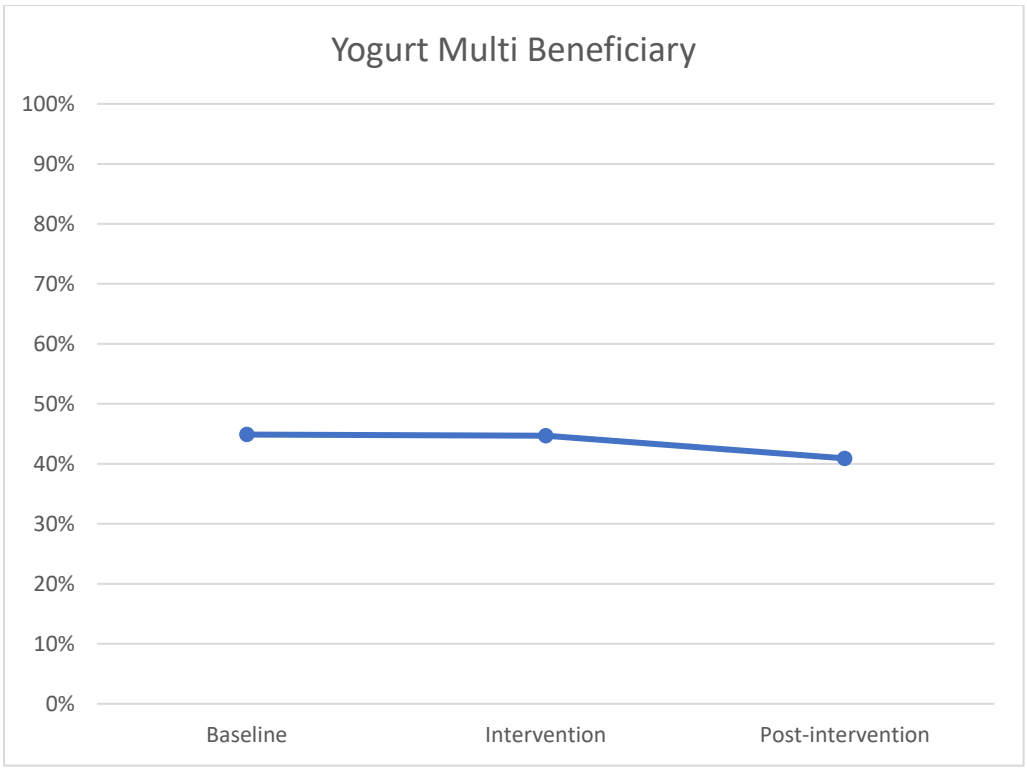
0%
Baseline
Intervention
Post-intervention

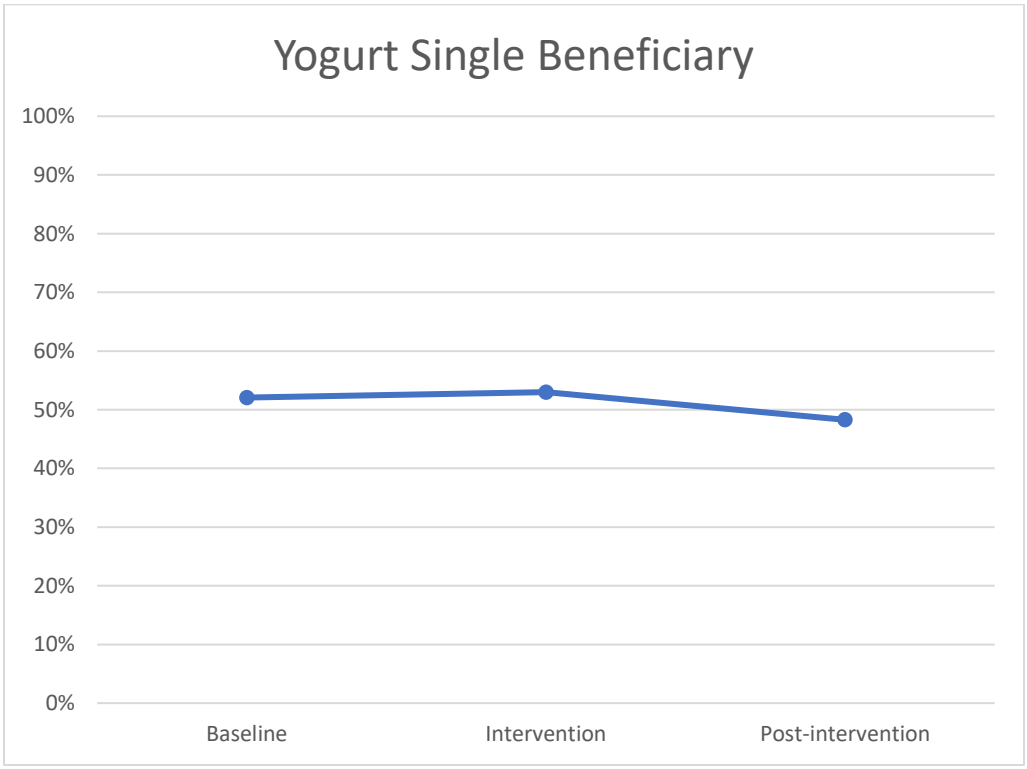

Reduced Fat Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

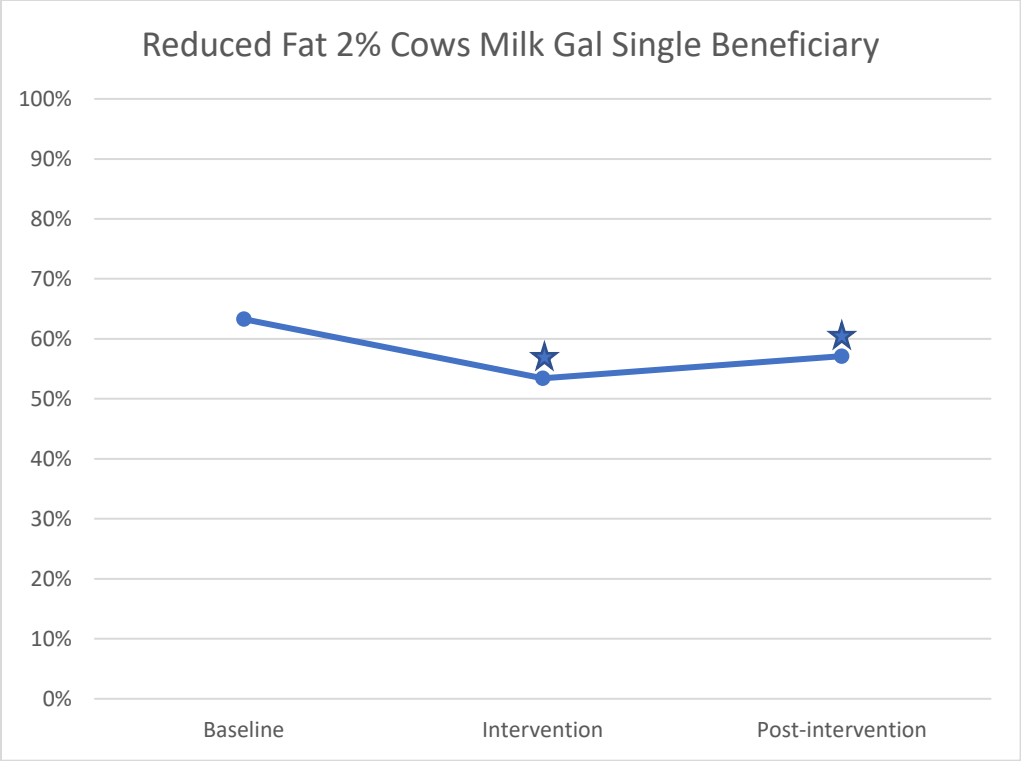

Reduced Fat Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

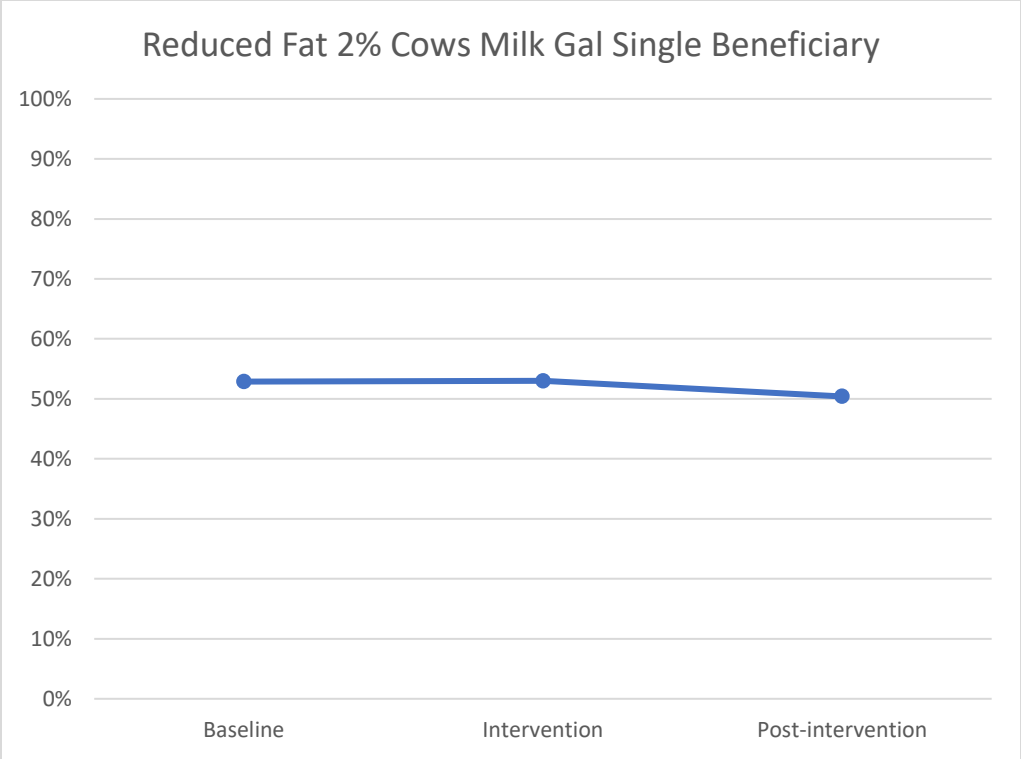

Whole Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

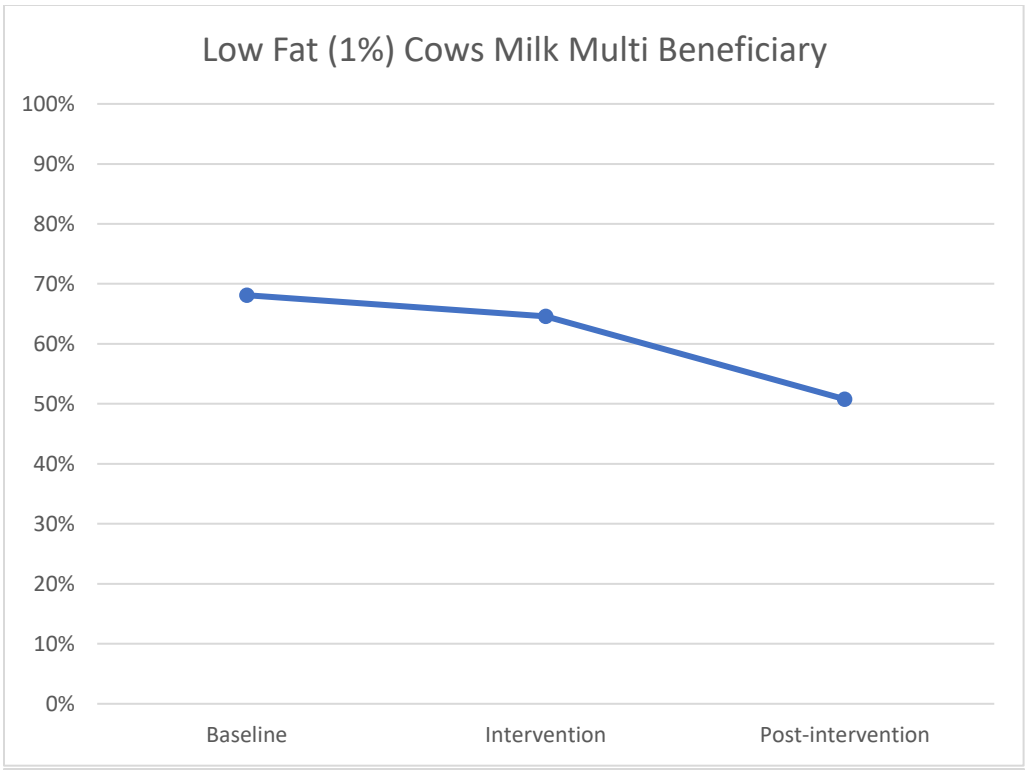

Whole Milk Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

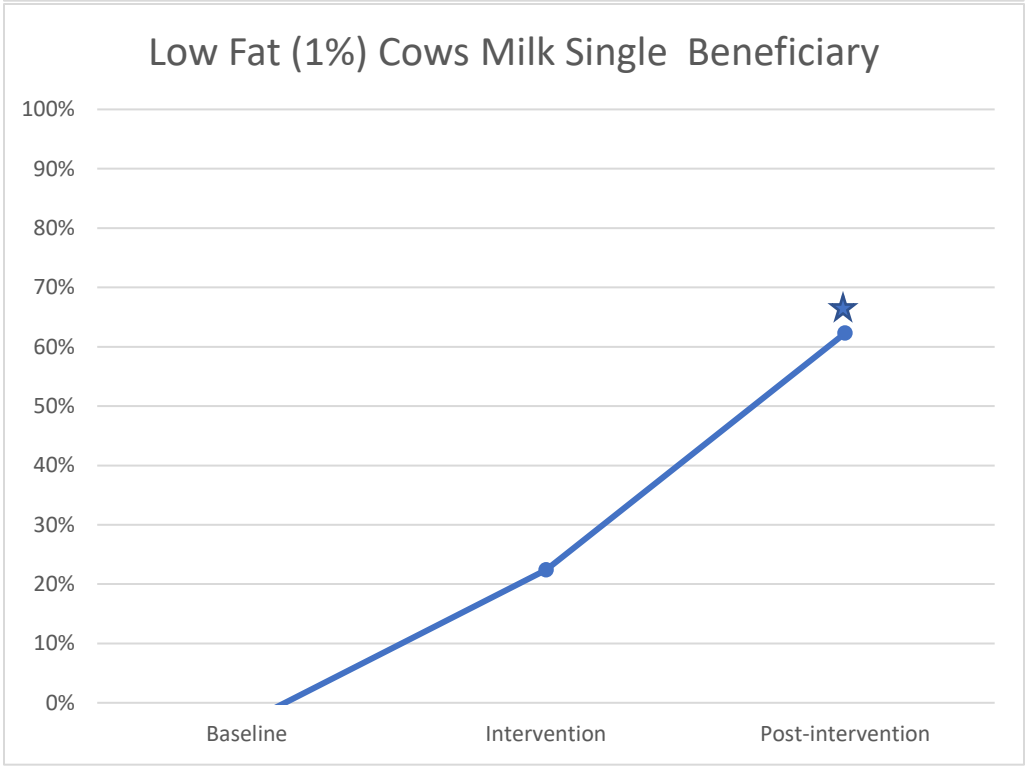

Yogurt Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

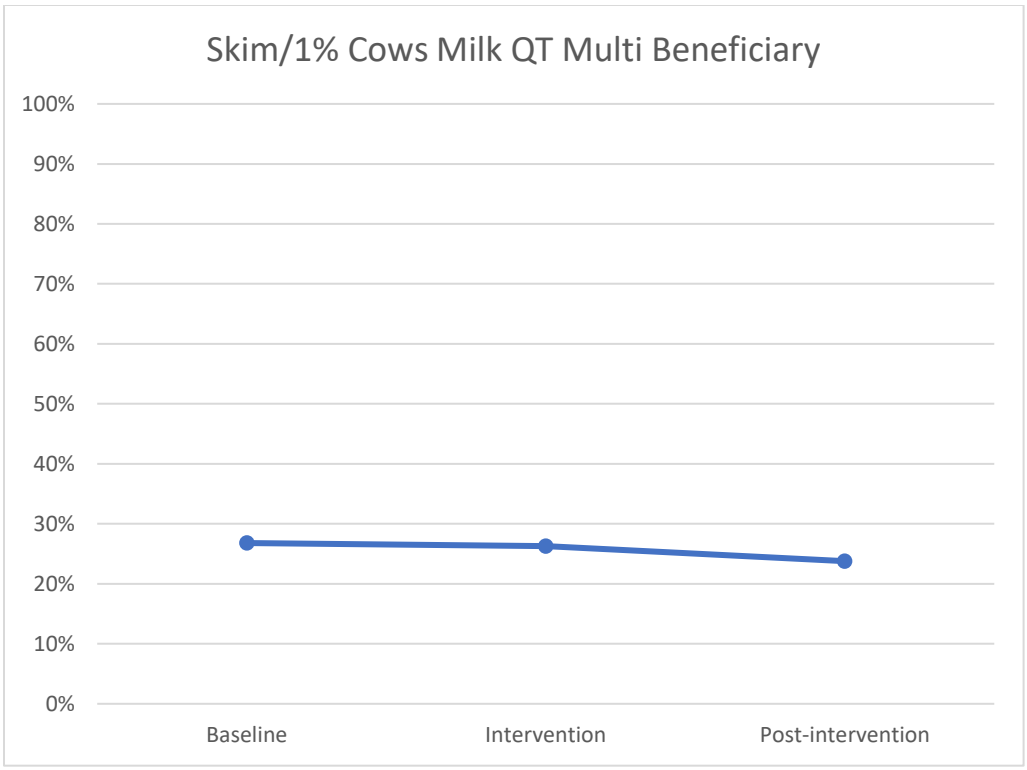

Yogurt Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

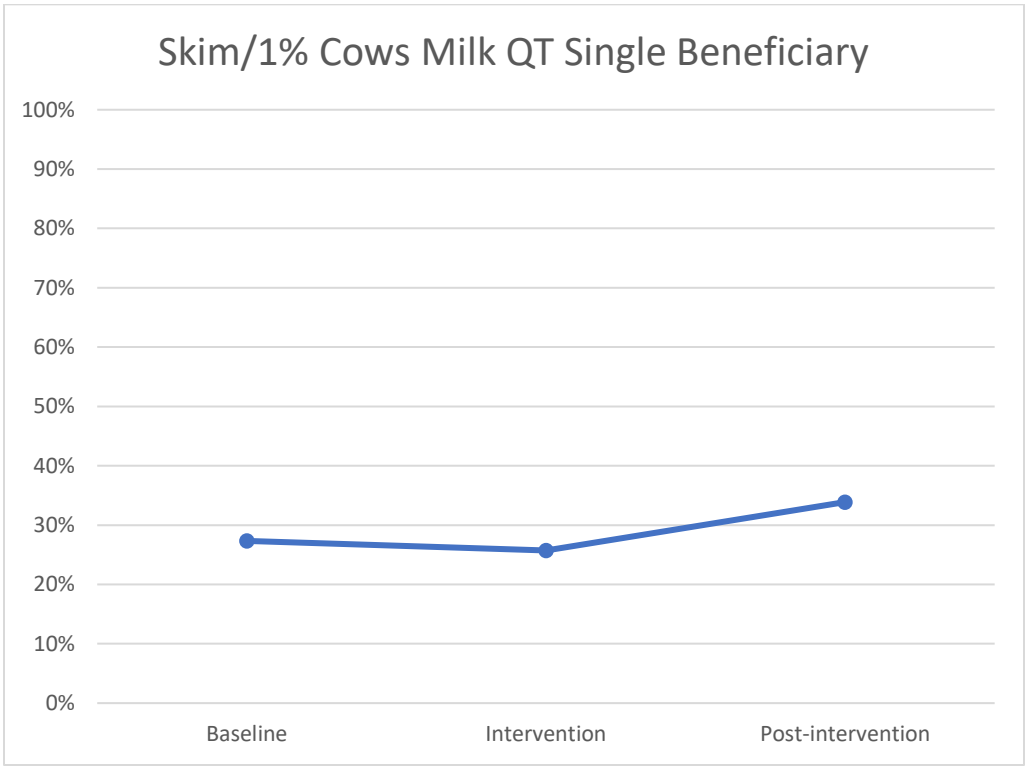

Reduced Fat 2% Cows Milk Gal Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

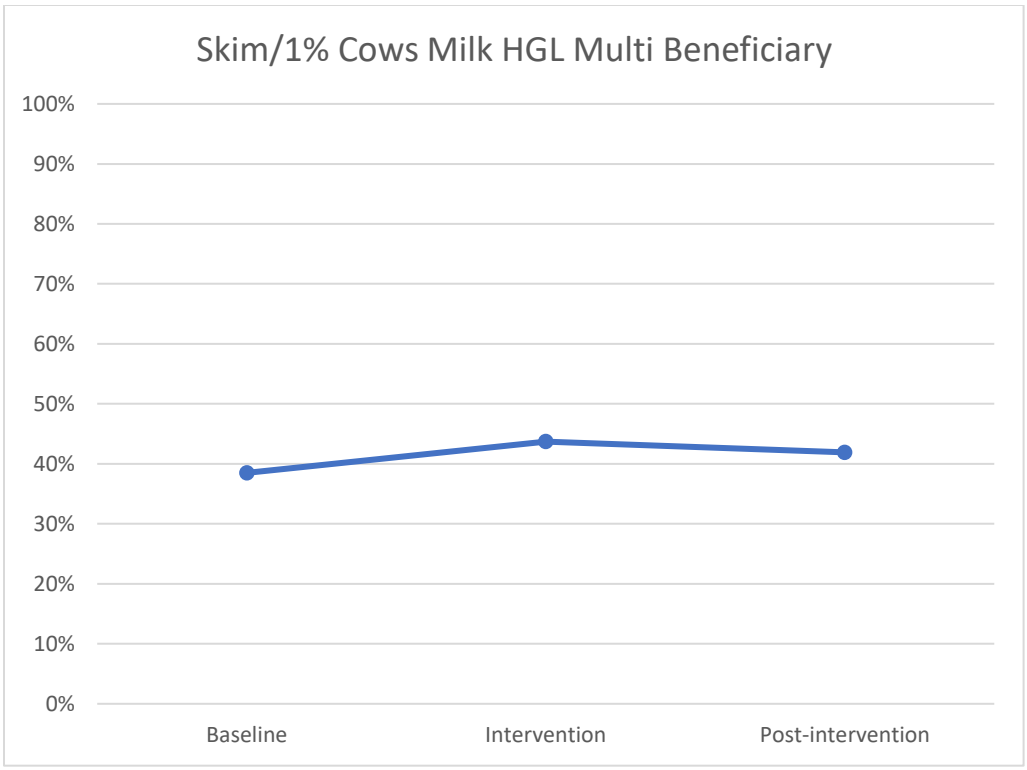

Reduced Fat 2% Cows Milk Gal Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

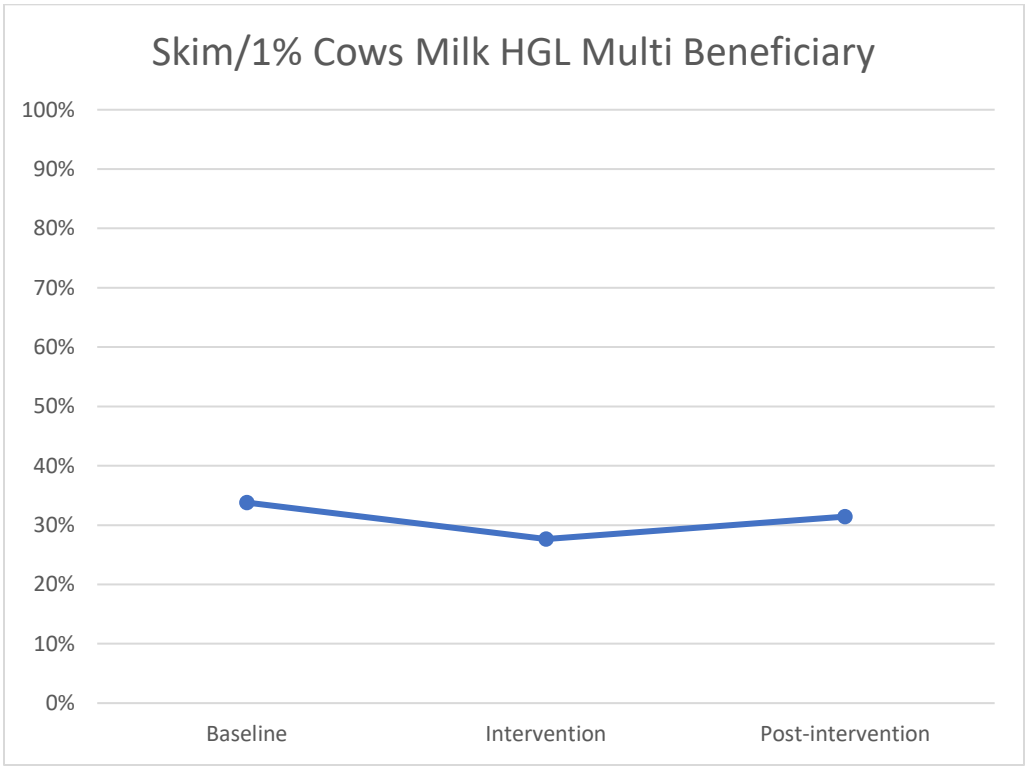

Low Fat (1%) Cows Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

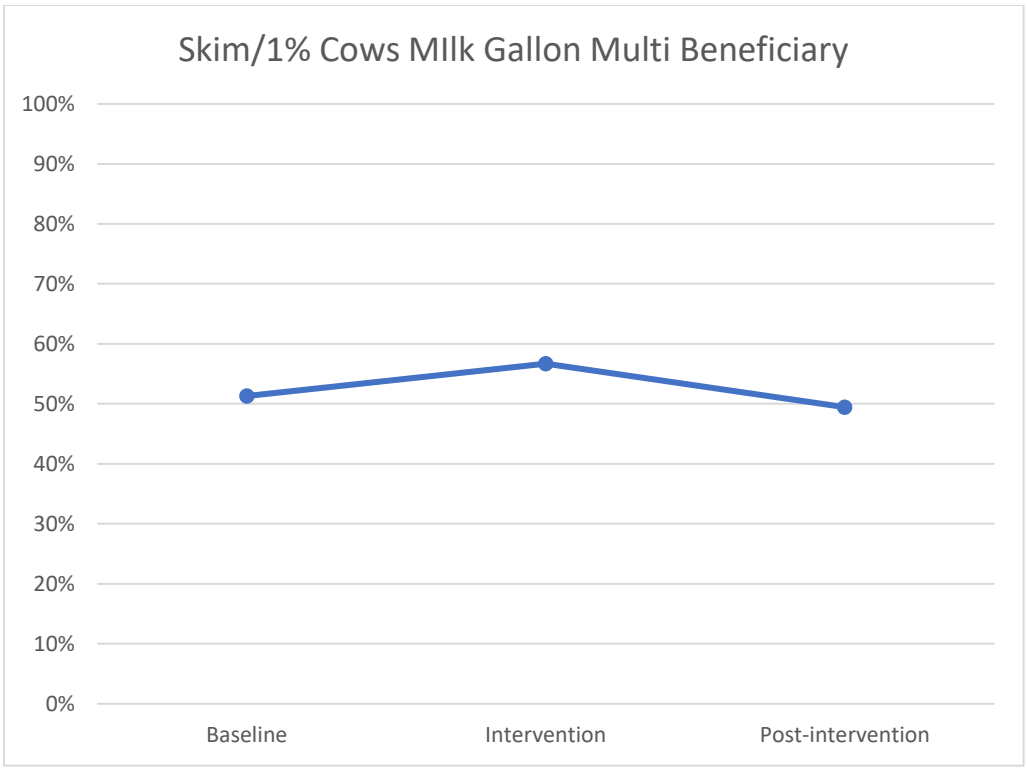

Low Fat (1%) Cows Milk Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

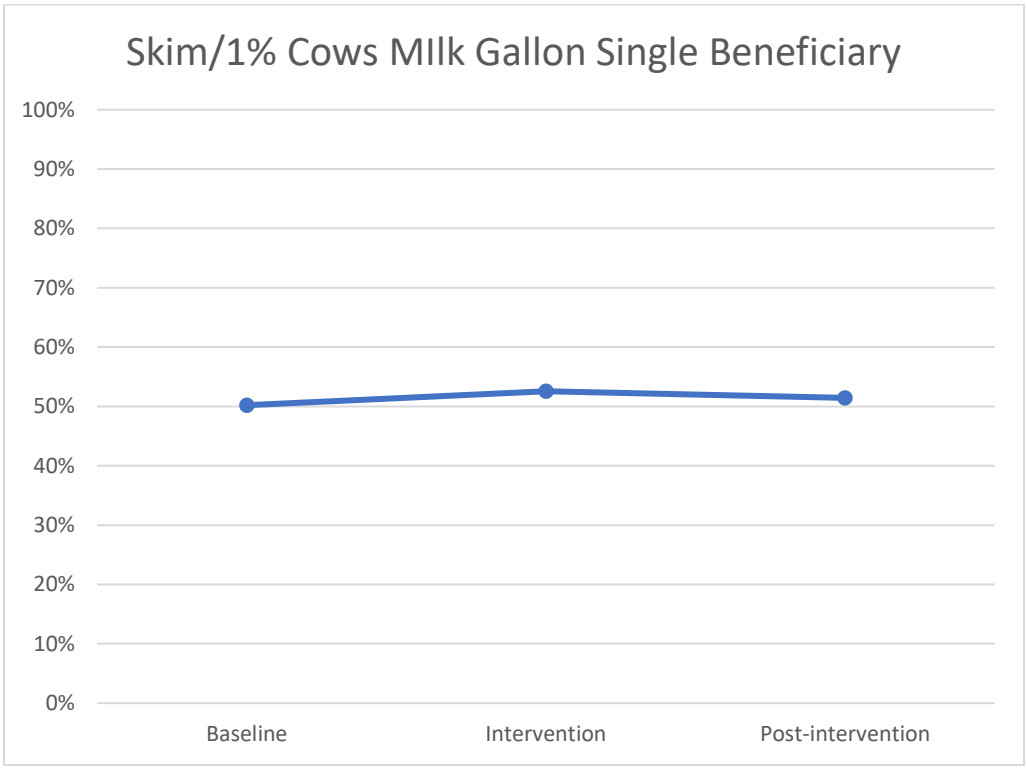

Skim/1% Cows Milk QT Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

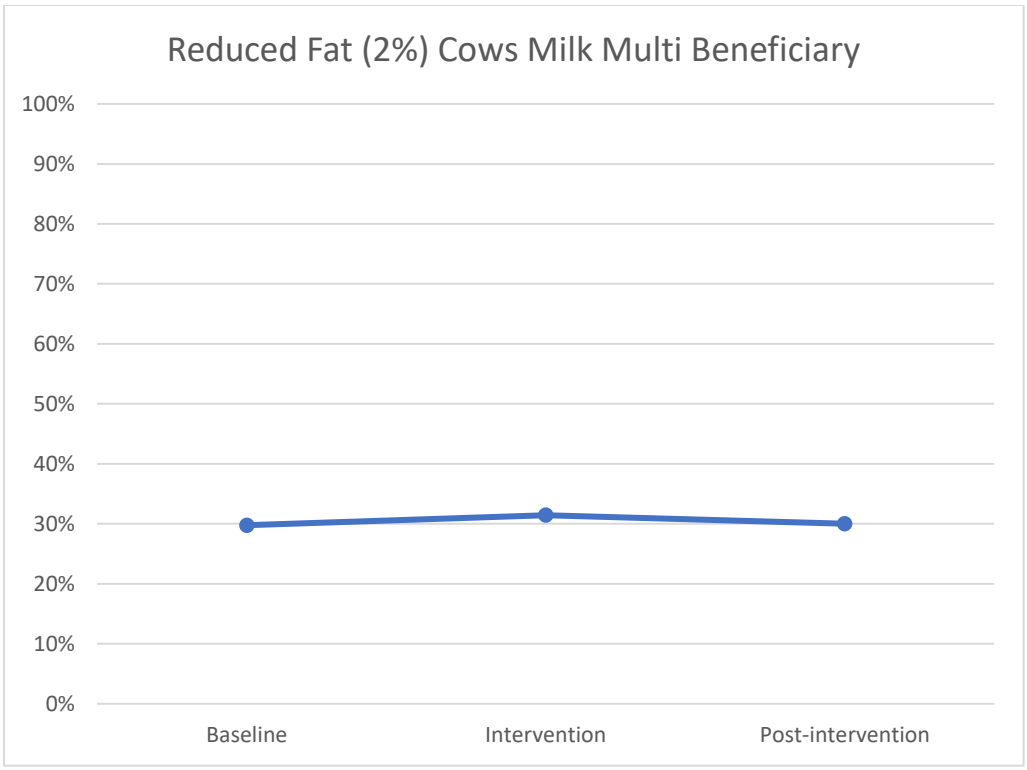

Skim/1% Cows Milk QT Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

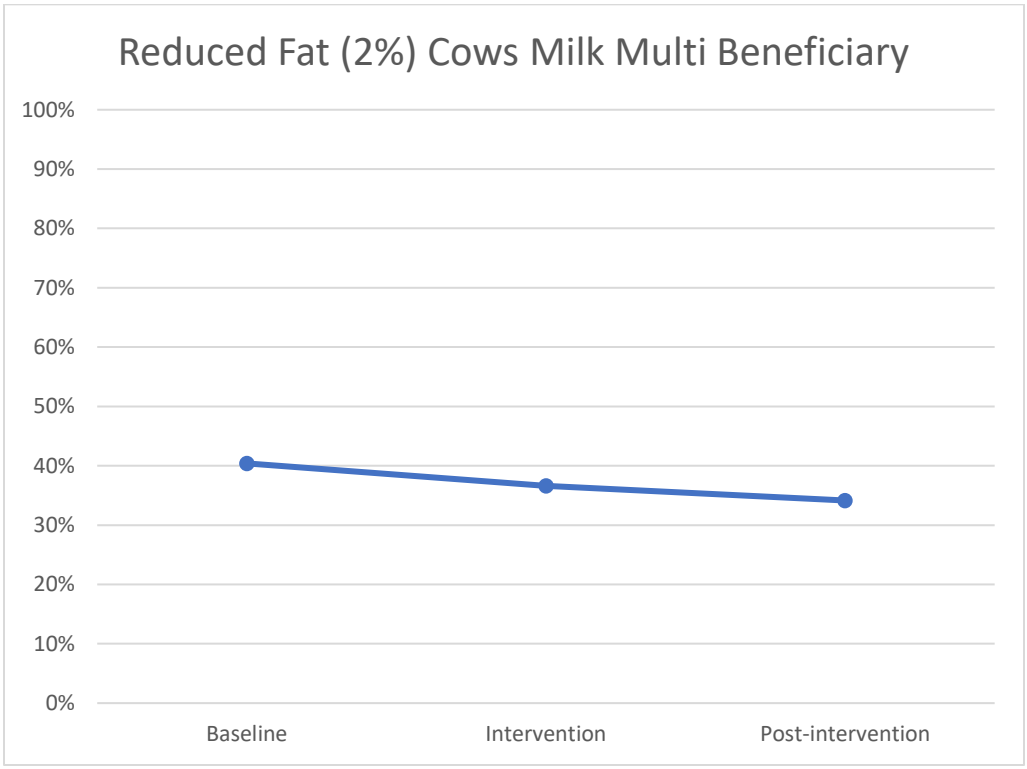

Skim/1% Cows Milk HGL Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

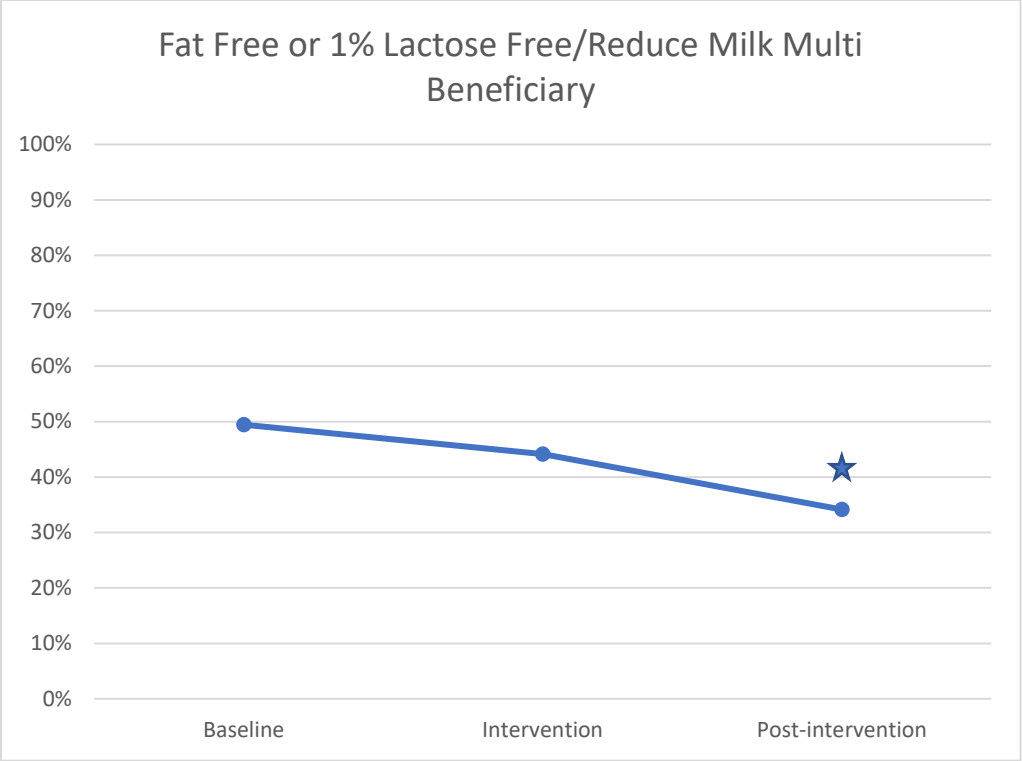

Skim/1% Cows Milk HGL Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention

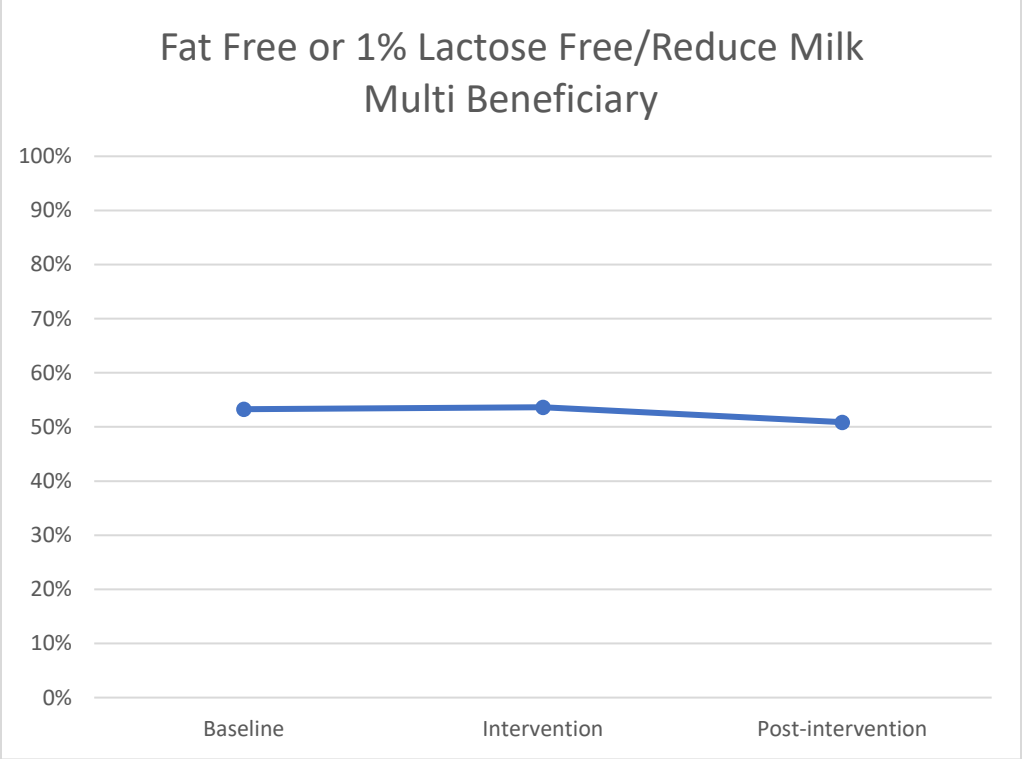

Skim/1% Cows MIlk Gallon Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention


Skim/1% Cows MIlk Gallon Single Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention


Reduced Fat (2%) Cows Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention


Reduced Fat (2%) Cows Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention


Fat Free or 1% Lactose Free/Reduce Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention


Fat Free or 1% Lactose Free/Reduce Milk Multi Beneficiary
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Baseline
Intervention
Post-intervention