2022

Best Practices for the Prevention and Treatment of Microcytic Hypochromic Anemia in Infancy

Janelle Paredes
Dominican University of California

https://doi.org/10.33015/dominican.edu/2022.NURS.ST.37

Best Practices for the Prevention and Treatment of Microcytic Hypochromic Anemia in Infancy

Janelle Paredes

Department of Nursing, Dominican University of California

NURS 4500: Nursing Research and Senior Thesis

Dr. Luanne Linnard-Palmer

Acknowledgments

I would like to dedicate this paper to my parents who made my nursing school journey possible. Truly, I would not be where I am today without you both. Thank you for all the love and support you have given me all these years. I love you both so much!

I would also like to dedicate this to my friends and family who have cheered me on through all my stages of life. Your support means the absolute world to me.

Lastly, I would also like to dedicate this paper to Dr. Luanne Linnard-Palmer. Thank you for giving me the guidance and support to write this paper. You have made the writing process enjoyable and I cannot thank you enough!

Table of Contents

Title Page……1

Acknowledgments……..2

Table of Contents……3

Abstract……...4

Introduction…….5

Problem Statement……..6

Purpose Statement……...7

Research Question……...7

Literature Review……7

Theoretical Framework……...13

Proposal for Further Study……..15

Conclusion……...18

Citations……...19

Abstract

Background: Microcytic hypochromic anemia is the most common nutritional deficiency in the world. This type of anemia is commonly found during infancy due to the lack of iron-fortified foods after six months of age. The effects linked to this deficiency can cause developmental delays and behavioral disturbances in infants if not treated immediately. Therefore, it is important for nurses to find the best practices to prevent microcytic hypochromic anemia to decrease its prevalence in infancy.

Objective: To find the best nursing practices for the prevention and treatment of microcytic hypochromic anemia in infancy.

Methods: This research will utilize a literature review relating to preventative measures for microcytic hypochromic anemia in infants.

Findings: The preventative measures for this anemia includes dietary prevention, proper breastfeeding, parental knowledge, and delayed cord clamping. It is important for health care professionals, especially nurses, to give appropriate education on these measures to parents and caregivers in order to decrease the incidence of microcytic hypochromic anemia in infants.

Proposal: A quantitative quasi-experimental study will be proposed in order to find the best practices for nurses to prevent and treat microcytic hypochromic anemia during infancy.

Keywords: microcytic hypochromic anemia, iron deficiency anemia, infancy, treatment, prevention

Introduction

Microcytic hypochromic anemia, better known as iron deficiency anemia (IDA), is the most common type of anemia in the world (WHO, n.d.). This occurs when the body has a low amount of adequate healthy red blood cells, and the cells present are small and pale. Iron deficiency anemia occurs when the iron supply in the body is too low and is unable to support normal red blood cell production. Iron is important in the production of red blood cells as it is needed to form hemoglobin, which is a part of red blood cells that carry oxygen and remove carbon dioxide from the body. Iron deficiency anemia has many different causes, including how the body absorbs iron, the demand for iron in the body increasing, or blood loss. The most common cause, especially in infants, is a diet low in iron. This makes the condition the most common nutritional deficiency for infants in the United States.

When infants are born, they have enough iron stored within their bodies from their mothers. The iron supply decreases by the time they are six months-old and they will need an outside source of iron. By the six month period, parents can start to incorporate iron-fortified foods like cereal or formula. Parents who do not have access to these iron-fortified foods may give their infants cow's milk as it is a cheaper option. However, cow's milk leads to anemia because it has less iron. It also does not have complete human protein which can lead to bleeding in the intestines and also makes it harder for the body to absorb iron.

The most common symptoms of iron deficiency anemia in infants include unusually pale skin, irritability, lack of energy, sore or swollen tongue, and shortness of breath. Iron deficiency anemia is preventable and treatable. Treatment usually starts with implementing iron-rich food in the infant's diet. This would include iron-fortified cereals, formula, and iron-rich pureed fruits

and vegetables like dark leafy greens, apples, and bananas. If the infant still has a low iron level with an iron-rich diet, then they may be treated with iron supplements that would be taken orally.

Problem Statement

In the United States, about 20% of children will be diagnosed with anemia (Cedars Sinai, n.d.).The most common type of anemia found in children in the United States and globally is microcytic hypochromic anemia. Infants, especially, have an increased demand for iron as their bodies are rapidly growing. Their dietary consumption of iron may not support their need for iron. There is a greater incidence of iron deficiency anemia in infants that consume cow's milk before the age of one (Nurseslabs, 2021). Cow's milk has a higher concentration of calcium, which competes with iron for absorption in the body. Cow's milk also has a specific protein that can irritate the lining of the stomach and intestine. This would eventually lead to bleeding in the GI system. Infants are more vulnerable to this type of anemia if their parents either do not follow this dietary guideline or have no access to iron-fortified foods.

As this is the most common nutritional deficiency in infants, nurses frequently see these patients in health care settings. Patient education about this condition is vital in order to prevent the number of cases from increasing. According to the World Health Organization, detection of iron deficiency is important as children under the age of two can have significant and irreversible effects on brain development. This would cause developmental delays and behavioral disturbances such as decreased motor activity, social interaction, poor learning, and attention to tasks in childhood (UCSF, 2008).

There are many ways in which anemia in childhood, specifically infancy, can be prevented. Iron replacement and diet change are well-known interventions. Delayed umbilical cord clamping has been addressed in the literature as an early preventative practice. If not

prevented, there are treatments for iron deficiency anemia. This includes oral iron supplements and blood transfusions, which happen in the severe stages of IDA. However, the most powerful treatment is education for the families. Nurses are the front-line educators for these families. They are also there to prevent anemia from happening in the first place. This all starts in the prenatal period with education on the importance of prenatal vitamins, breastfeeding, and good nutrition. The nurse can also provide information on delayed cord clamping before the birth of the child. Nurses are the gateway to early identification as they are masterful at assessments.

The purpose of this paper is to investigate best practices for healthcare professionals to prevent iron deficiency anemia, such as microcytic hypochromic anemia in infancy. How can nurses support best practices in the prevention of anemia in childhood?

The general research questions created to guide the literature review are:

1. What are preventative measures to reduce the incidence of childhood anemia?
2. How influential is delayed cord clamping on the prevention of anemia in infancy?

Literature Review

The author explored the two general research questions through the available literature related to the topic of anemia. There was limited research done on childhood anemia in regard to nursing practice. However, the research articles that were found related can be used as educational tools for healthcare professionals as a whole. The search terms used to find these articles included: “anemia”, “iron deficiency anemia”, “infancy”, “prevention”, and “treatment”. The research articles were found through CINAHL and PubMed. In order for the articles to be included in this literature review, they must support and relate to the purpose of this study. The articles were organized into different sections: Dietary Prevention; Breastfeeding as a

Preventative Measure; Parental Knowledge and Prevention; Iron Deficiency Anemia in High-Income vs. Low-Income Areas; and Delayed Umbilical Cord Clamping.

Dietary Prevention

Awasthi et al. (2020) conducted a cross-sectional study to see the effectiveness of micronutrient-fortified infant cereal in improving the iron status and neurodevelopment in infants in India. A sample of 160 infants between the ages of six and twelve months that were non-anemic and mildly anemic was separated into an experimental group and a control group. The experimental group included the 6 month old infants that were healthy and were within the WHO growth standards. The control group included the twelve month old infants that were also healthy and within WHO growth standards.

The experimental group was given 50 g/d of a fortified cereal during their baseline visit that occurred two weeks after the initial screening. They were given the fortified cereal for the next six months in addition to their habitual complementary feeding regimen. The daily recommended intake (DRI) for infants in India is 5 mg, the cereal given provided 75% of the DRI while the other complementary foods such as breast milk could still contribute to this number. The caregivers were directed to give the 50 g either as one serving or split into two servings of 25 g. Assessments of the infants were done at nine months which was the midpoint of the study and at twelve months which was the end of the study. The control group was a part of the study for only two weeks as they were already twelve months of age. The researchers recorded their information from the control group in order to compare their results to the experimental group.

The researchers found that hemoglobin (Hb) concentration was higher in the experimental group at twelve months old than in the control group at the same age. The serum

ferritin, which is the blood protein that contains iron, was also higher in the experimental group than in the control group at twelve months. The prevalence of anemia in the experimental group was 49% lower than in the control group. IDA was 77% lower in the experimental group than in the control group as well. By twelve months of age, only 1% of the experimental group had moderate anemia while it was 26% in the control group. The study also found that language development, motor development, social-emotional behavior, and adaptive behavior measured by the Bayley-III scale were higher in the experimental group. This research suggests that six month old infants who consume an iron-fortified cereal for six months have better iron levels and lower rates of IDA at twelve months than infants who do not consume iron-fortified cereal.

The limitations of this study included the assumption that the control group had the same iron levels at six months as the experimental group. There was no measurement of iron status for the control group at six months. The design was not randomized as well, so unknown factors may have influenced the results.

Breastfeeding as a Preventative Measure

Uyoga et al. (2016) conducted a cross-sectional study to see if the duration of breastfeeding would have a positive impact on iron status in infants in Kwale County which is a rural part of Kenya. A sample of 134 infants between the ages of six to ten months old who were generally healthy and not severely anemic (Hb ≥ 70 g/L) participated in the study.

The data was collected through a baseline survey given to their primary caregivers that included infant age, gender, duration of exclusive breastfeeding, maternal age, level of education of the mothers, source, and level of income, etc. A 3 mL blood sample was collected from the infants to measure Hb, soluble transferrin receptor (sTfR), plasma ferritin, and C-reactive protein

(CRP). Lastly, data was collected from the hospital database that included birth weight, gestational age at birth, place of birth, and infant health status.

The researchers found that the duration of exclusive breastfeeding ranged from 0.25 to 9 months with a median age of 6 months. The overall prevalence of anemia within the entire sample was 74.6%. The researchers separated into two groups, infants who were exclusively breastfed to at least six months (EBF) and infants who were not exclusively breastfed to six months (non-EBF). The study showed that the EBF group had a higher Hb concentration than the non-EBF group. While sTfR was lower in the EBF group, this lab is interpreted as inversely related to iron status. A lower level of sTfR means there is a good amount of iron storage in the body. The research suggests that longer exclusive breastfeeding is associated with better iron status in infancy. This also supports the WHO recommendation to exclusively breastfeed for at least six months to improve iron status, growth, and development of the infants.

The limitations of this study included the self-reported data collection through the survey. Participants may provide false information regarding the questions on the duration of exclusive breastfeeding, the level of education of the mother, etc. Another limitation included was the small sample size. It is possible that families of higher socioeconomic status have a lower risk of IDA and will have a higher adherence level to exclusive breastfeeding. However, the data showed that the mothers in the study who had a primary level of education with a mid-level income had a longer duration of exclusive breastfeeding.

Parental Knowledge and Prevention

Ngimbudzi et al. (2016) conducted a cross-sectional study that explored the knowledge, attitudes, beliefs, and practices of mothers with infants diagnosed with anemia in Tanzania. A sample of 40 mothers was surveyed in the pediatric ward in Mkuranga District Hospital.

Researchers used a structured closed-ended questionnaire that checked the mothers' knowledge of anemia and their level of education. The survey had questions on their beliefs about the relationship between witchcraft and illness, local remedies, exclusion of certain foods, and their feeding practices for their infants.

The results of the study showed clear evidence that the level of education and knowledge influences health outcomes. Out of the data, 40% of the mothers were illiterate, < 5% had primary school education, and only 2% had studied beyond primary school. Researchers found that 55% of participants had prior knowledge of anemia. Only a small proportion of the participants knew the relation between maternal anemia and infant anemia. As far as their cultural beliefs, some mothers believed the causes of anemia included witchcraft, local remedies, and eating certain foods, specifically lemons. For their feeding practices, only 55% of the participants associated anemia with feeding practices, and 50% of them reported that they were still breastfeeding. The research suggests that the mothers' beliefs regarding anemia in their children were frequently influenced by cultural beliefs. These findings support the idea of physicians intervening during pregnancy and in the earlier stages of the infant's life with information about anemia.

The limitations of this study included a small sample size and only accounts for institutional-based anemia which can skew the results as it only represents infants with anemia who need an acute level of care due to their illness. The researchers acknowledged the desire to replicate this study with a larger sample size that includes both institutional and community-based anemia.

Iron Deficiency Anemia in Developed vs. Developing Countries

Mantadakis et al. (2020) wrote an informative article comparing iron deficiency anemia in children residing in developed vs. developing countries. Addressed in this article, about 25% of the world's population are diagnosed with anemia while half of them have IDA. Most of them reside in resource-poor countries. In developing countries, the most common etiology of IDA is poor iron bioavailability due to limited resources. Their diets are mostly based on cereal or legume-based flours which are rich in phytates, which is an inhibitor of iron absorption. These foods are easier to access than more iron-rich foods like meat, poultry, and fish. While, in developed countries, the most common etiology of IDA is gastrointestinal and genital blood loss and dietary mistakes like prolonged breastfeeding without iron supplementation beyond 4 months, the introduction of cow's milk before twelve months, bottle use in bed, etc.

Delayed Umbilical Cord Clamping

Sundrararajan (2020) conducted a systematic review on the determinants and treatments of iron deficiency anemia in infancy and toddlerhood. There are two studies that reviewed the effects of delayed umbilical cord clamping (DCC) on the iron status of infants. Chaparro et al. (2006) conducted a randomized controlled trial in a large obstetric hospital in Mexico City. Cernadas et al. (2010) also conducted a randomized controlled trial in a hospital in Argentina.

The first study had a sample of 476 infants that were randomly separated into two groups, early or delayed clamping, by a random digit generator in Microsoft Excel. In the early clamping group, the umbilical cord was clamped ten seconds after birth. While the umbilical cord was clamped two minutes after birth in DCC. Both groups were followed up until six months postpartum. The second study had a sample of 276 infants that were randomly assigned into three groups corresponding to cord clamping time. 86 of the participants had their cords clamped early at fifteen seconds, 83 participants had their cords clamped at one minute, and 83 at three

minutes. The participants were followed up six months after the study to measure ferritin and Hb levels.

The researchers in the first study found that a DCC of two minutes can increase six month iron storage by about 27-47 mg at six months of age. The researchers in the second study found that a DCC of three minutes significantly increased serum ferritin levels in six month old infants compared to the early clamping group. There is also a three times higher incidence of IDA among the participants that received early cord clamping. The researcher of the systematic review added that DCC is an intervention that decreases the risk of IDA and is a low-cost non-dietary option. Overall, DCC's benefits include increased Hb, increased iron storage, and better motor development outcomes in childhood.

Overall Discussion of the Literature

The literature review acknowledged the preventative measures for microcytic hypochromic anemia, as well as the difference between IDA in infants in low-income areas versus high-income areas. The literature suggests that parents are the most important factor in prevention as they are in charge of their infants' lives. Parental knowledge about IDA is needed in order to reduce the prevalence rate globally. Although there is limited research on childhood anemia, it is still important for nurses to provide sufficient education to the parents in order to prevent and treat microcytic hypochromic anemia in their infants.

Theoretical Framework

The theoretical framework used to support this proposed research study is Pender's Health Promotional Model. This was developed by Dr. Nola Pender who is a nursing theorist and nurse educator. The first version of this model was published in 1982 with the theory that the quality of life of a patient could be improved by the prevention of problems before they have

occurred. The purpose of Pender's model is to help nurses understand the major determinants of health behaviors to promote healthy lifestyles through behavioral counseling.

In the health promotion model (HPM), there are fourteen theoretical statements that can provide a basis for investigative work on health behaviors. There are four specific statements that support the specific research on IDA: "(1) Prior behavior and inherited and acquired characteristics influence beliefs, affect, and enactment of health-promoting behavior; (3) Perceived barriers can constrain commitment to action, a mediator of behavior as well as actual behavior; (6) Positive affect toward a behavior results in greater perceived self-efficacy; (9) Families, peers, and health care providers are important sources of interpersonal influence that can increase or decrease commitment to and engagement in health-promoting behaviors" (Pender, N., n.d, p. 5).

These statements support the idea that healthcare professionals are important in the prevention of IDA in infancy. Parental education is needed on the severity of IDA in their infants. There has to be an understanding of the disorder and adherence to the treatment plan by the parents in order to prevent the infant from being anemic for a longer time. However, this may be difficult for parents with specific beliefs, such as cultural, spiritual, and religious, that may not match the medical standpoint. It is important for healthcare professionals to respect these beliefs, but also educate these parents through a medical view. Parents need support from healthcare professionals, like nurses, to help them adhere to the treatments. Healthcare professionals can be a huge influence in promoting iron-rich foods and iron supplements for the treatment of IDA. They can also exhibit positive reinforcement towards the parent's behaviors in relation to following the treatment plan in order to increase the confidence of the parents and the likelihood of continuous adherence.

Proposal for Further Study

With the five articles discussed in the literature review, IDA prevention can be done in many different ways. However, all of these preventative measures are done by the parents and caregivers as they will be implementing these on their children. Tis important for nurses to find the best ways to support parents and caregivers and give them resources for the prevention of IDA. Based on the literature review findings, the researcher is proposing a study based on finding the best practices for nurses to prevent microcytic hypochromic anemia in infancy. In a pediatric public health clinic, what is the impact of implementing a care bundle compared to typical patient education for preventing further microcytic hypochromic anemia in a period of one month?

Methods

The proposed study will use a quantitative quasi-experimental design to determine the best nursing practices to prevent microcytic hypochromic anemia in infancy.

Site and Sample

The sample includes families with infants between six and twelve months old diagnosed with IDA recruited from the Children's Health Center that is under the San Francisco Department of Public Health. The sampling design for this study would be a convenience sample. The researcher will get permission and engagement from the site manager to conduct this study. The total proposed sample size will be fifty participants. The first twenty-five patients diagnosed with IDA that come through the clinic will get typical teaching. While the next twenty-five patients afterward will get the care bundle. The study will be explained to all the parents and caregivers of the participants. Afterward, they will give written consent to sign to be a part of the study.

Ethical Considerations

The researcher acknowledges that the participants of this study are a part of a vulnerable group as they are between the ages of six months to twelve months old. Parents are informed of the study prior to the implementation of patient education and are given written consent. Throughout the study, the names of the participants will not be used at any point. Instead, the participant will be given a number that corresponds to the order they walked into the clinic.

The study will be submitted to the Institutional Review Board at Dominican University of California for permission to conduct the study while protecting the participants. Participants will be told that they may leave the study at any time.

Methodology

The first twenty-five secured participants getting the typical teaching will be known as the control group. Typical teaching includes the physician talking to the parents and caregivers about the damaging effects of this condition, nutrition and how to increase iron in the diet, the usage of oral iron supplements as a treatment, and lastly the importance of getting the infant's blood drawn again for a complete blood count and ferritin blood test. Usually, the physician would explain the components of a complete blood count. Afterward, they would advise the parents and caregivers to get the infants' labs drawn eight weeks and twelve weeks after the clinic visit to check if iron levels have elevated.

For the next twenty-five participants, they will be receiving typical teaching on top of a care bundle that is implemented by the nurse. This group will be known as the experimental group. The care bundle, which is the independent variable, includes a nursing telehealth call three days after the clinic visit to ask the parent or caregiver how much iron the infant is receiving through their diet and adherence to the ordered oral iron supplements. After the initial

telehealth call, the nurse will call every four days for a follow-up for the next eight weeks until the participant can get their labs drawn. During these calls, the nurse will ask how much iron is being given and how the process is going. The nurse will emphasize honesty during these calls, so the parent or caregiver can give the nurse the true and full story of their child's treatment process. Once they get their laboratory analysis (week eight and twelve from the initial visit) drawn and the results are available, the participants will be asked to come into the clinic for a nurse-focused follow-up. From there the nurse will look over the results with the physician and families. The nurse can give extra guided support if needed for the families.

Analysis

After this study is completed, the data collected will be from the results of blood analysis taken every two months after the initial clinic visit. The lab values that will be analyzed are hemoglobin, hematocrit, ferritin, and iron levels. The normal lab values from the complete blood count for six month old to two years old: hemoglobin is 11.0-13.5 g/dL, hematocrit is 31-42% (UpToDate, 2022). The normal lab value from the ferritin blood test for six month old to fifteen years is 7-140 ng/mL (URMC). The data collected from the experimental group who received the care bundle will be compared to the control group to see if the extra nursing care increases the adherence of the families to the treatment plan which in turn stops anemia and prevents further or future anemia from occurring in the child. After examining the results, the researcher may have a better understanding of the effective practices nurses can do to help treat and prevent microcytic hypochromic anemia.

Limitations

The researcher acknowledges that there are limitations to this study. The participants are only from one clinic in San Francisco, so the sample represents a small size of the population.

The sample size is small as it is limited to fifty participants. The researcher does not believe this will lower the external validity. There may be other external factors that the participants and their families may be going through, that can affect their adherence to the treatment to both the care bundle and typical patient education.

However, this study can still add valuable data to finding the best practices for nurses to treat and prevent microcytic hypochromic anemia in infants. The results from this study can help future research dedicated to preventing anemia in infancy, especially since anemia still has a high prevalence rate around the world.

Conclusions

With this further study, the researcher is able to capture the importance of supportive and attentive nursing care in regard to the treatment of microcytic hypochromic anemia. That would contribute to the prevention and reduce the prevalence of anemia in infants. The data from the study would be able to be generalized to the greater population (external validity), especially since the treatment is the same throughout the world. There is clinical significance in this research as it will help nurses around the world implement better practices that can help educate the parents and caregivers on anemia, which can reduce the incidence of it in infants. The researcher hopes to repeat this study that includes more clinics across the United States with a bigger sample size in order to find more nursing practices that are effective in preventing and treating microcytic hypochromic anemia in infants.

Citations

Belleza, M. (2021, February 11). Iron deficiency anemia nursing care management. Nurseslabs. Retrieved from https://nurseslabs.com/iron-deficiency-anemia/

Cedars Sinai. (N.D.). Anemia in Children. Retrieved from https://www.cedars-sinai.org/health-library/diseases-and-conditions---pediatrics/a/anemia-in-children.html

Ceriani Carnadas, J. M., Carroli, G., Pellegrini, L., Ferreira, M., Ricci, C., Casas, O., Lardizabal, J., & Morasso Mdel, C. (2010). The effect of early and delayed umbilical cord clamping on ferritin levels in term infants at six months of life: a randomized, controlled trial. *Archivos Argentinos de Pediatría, 108*(3), 201-208. https://europepmc.org/article/med/20544134

Chaparro, C. M., Neufeld, L. M., Alavez, G. T., Cedillo, R. E., & Dewey, K. G. (2006). Effect of timing of umbilical cord clamping on iron status in Mexican infants: a randomised controlled trial. *The Lancet, 367*(9527), 1997-2004. https://doi.org/10.1016/S0140-6736(06)68889-2

Fact sheets for families iron deficiency in early childhood. (n.d.). Retrieved from https://cchp.ucsf.edu/sites/g/files/tkssra181/f/IronDeficiency_En0908.pdf

Mantadakis, E., Chatzimichael, E., & Zikidou, P. (2020). Iron Deficiency Anemia in Children Residing in High and Low-Income Countries: Risk Factors, Prevention, Diagnosis and Therapy. *Mediterranean Journal of Hematology and Infectious Diseases, 12*(1). https://doi.org/10.4084/mjhid.2020.041

Ngimbudzi, E. B., Lukumay, A. M., Muriithi, A. W., Dhamani, K. A., & Petrucka, P. M. (2016). Mothers' Knowledge, Beliefs, and Practices on Causes and Prevention of Anaemia in Children

Aged 6 - 59 Months: A Case Study at Mkurunga District Hospital, Tanzania. *Open Journal of Nursing, 6*(4), 342-352. https://doi.org/10.4236/ojn.2016.64036

Pender, N. (N.D.) The Health Promotion Model Manual. Retrieved from https://deepblue.lib.umich.edu/bitstream/handle/2027.42/85350/HEALTH_PROMOTION_MANUAL_Rev_5-2011.pdf

Sundararajan, S., & Rabe, H. (2021). Prevention of iron deficiency anemia in infants and toddlers. *Pediatric Res*earch, *89*, 63–73. https://doi.org/10.1038/s41390-020-0907-5

University of Rochester Medical Center. (n.d.). Ferritin (Blood) - Health Encyclopedia. Retrieved from https://www.urmc.rochester.edu/encyclopedia/content.aspx?contenttypeid=167&contentid=ferritin_blood

UpToDate. (n.d.). Normal values for hematologic parameters in children. Retrieved from https://www.uptodate.com/contents/image?imageKey=PEDS%2F101544

Uyoga, M. A., Karanja, S., Paganini, D., Cercamondi, C. I., Zimmermann, S. A., Ngugi, B., Holding, P., Moretti, D., & Zimmermann, M. B. (2016). Duration of exclusive breastfeeding is a positive predictor of iron status in 6- to 10-month-old infants in rural Kenya. *Maternal and Child Nutrition, 13*(4). https://doi.org/10.1111/mcn.12386