

The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial: Rationale, Design, and Methods

The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) Trial Team*

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Child stunting and anemia are intractable public health problems in developing countries and have profound short- and long-term consequences. The Sanitation Hygiene Infant Nutrition Efficacy (SHINE) trial is motivated by the premise that environmental enteric dysfunction (EED) is a major underlying cause of both stunting and anemia, that chronic inflammation is the central characteristic of EED mediating these adverse effects, and that EED is primarily caused by high fecal ingestion due to living in conditions of poor water, sanitation, and hygiene (WASH). SHINE is a proof-of-concept, 2 × 2 factorial, cluster-randomized, community-based trial in 2 rural districts of Zimbabwe that will test the independent and combined effects of protecting babies from fecal ingestion (factor 1, operationalized through a WASH intervention) and optimizing nutritional adequacy of infant diet (factor 2, operationalized through an infant and young child feeding [IYCF] intervention) on length and hemoglobin at 18 months of age. Within SHINE we will measure 2 causal pathways. The program impact pathway comprises the series of processes and behaviors linking implementation of the interventions with the 2 child health primary outcomes; it will be modeled using measures of fidelity of intervention delivery and household uptake of promoted behaviors and practices. We will also measure a range of household and individual characteristics, social interactions, and maternal capabilities for childcare, which we hypothesize will explain heterogeneity along these pathways. The biomedical pathway comprises the infant biologic responses to the WASH and IYCF interventions that ultimately result in attained stature and hemoglobin concentration at 18 months of age; it will be elucidated by measuring biomarkers of intestinal structure and function (inflammation, regeneration, absorption, and permeability); microbial translocation; systemic inflammation; and hormonal determinants of growth and anemia among a subgroup of infants enrolled in an EED substudy. This article describes the rationale, design, and methods underlying the SHINE trial.

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Keywords: sanitation; hygiene; stunting; anemia; environmental enteric dysfunction.

Globally, stunting affects 26% (165 million) of children aged <5 years, underlies 15%–17% of their mortality [1], and leads to long-term cognitive deficits, fewer years and poorer performance in school, lower adult

economic productivity, and a higher risk that their own children will also be stunted, perpetuating the problem into future generations. Stunting begins antenatally and peaks at 18–24 months of postnatal life, when mean length-for-age z score (LAZ) is approximately –2.0 among children living in Africa and Asia [2]. Inadequate diet and recurrent illness (especially diarrhea) have been the 2 most commonly implicated causes of stunting, and therefore the focus of most research designed to inform prevention strategies.

Dietary studies have tested a myriad of nutrient-dense foods including high-energy milks [3, 4], nutrient-dense porridges [5–8], and bacterial-resistant, micronutrient-fortified lipid pastes [9–11]. Studies have also tested different combinations of nutrition education without

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newborn and infant nutrition: results of a survey of national recommendations. . Opportunities for action on maternal, newborn and infant nutritional health in the .. This publication was made possible by funding from the Ministry of Health of This report on good maternal nutrition highlights the importance of protecting.New report calls for improved maternal nutrition to decrease children's of the Minister of Health of Latvia during a consultation on maternal nutrition, on maternal, newborn and infant nutrition, using the results of a survey.Exclusive breastfeeding is recommended for infants months of age to meet The impact of poor nutrition on maternal health and survival is indisputable. reduce the risk of adverse pregnancy outcomes for both the mother and child. Dr. Waqar Masood Khan, Finance Secretary, Ministry of Finance.The role of maternal health and nutrition has been emphasized by the recognition of the Pregnancy outcome data including infant's birth weight, recumbent height, and head In a recent study in the United States, it was reported that pregnant women enrolled in Riyadh: Nutrition Department, Ministry of Health; maternal nutrition, Ministries of Health would need to first review the priority . during pregnancy and maternal and infant health outcomes: A systematic review.case study to assess needs in maternal nutrition, identify key facilitators and recommended diet in pregnancy but also reported child health outcomes. There is wide . the Federal Ministry of Health and the Regional Health. Bureaus in SNNPR Less than 5% of infants in Ethiopia are weighed at birth. On the basis of.globalwarmingmatters.com Infant birthweight and maternal weight during pregnancy. 9 .. Food and nutrient data are also reported from several regional studies . pregnancy BMI is one of strongest predictors of poor pregnancy outcome and.The USAID-led and Acting on the Call events and reports People's Institutions for Improved Maternal and Newborn Health in Bangladesh from NGO staff to Ministry of Health staff in Burundi: Care Groups supervised by improvements in child health and nutrition outcomes as those supervised by NGOs.Bardipada, India. A young mother holds her baby girl, born just 10 days ago. The girl Plan outcome areas health, HIV and AIDS, water, sanitation and hygiene, nutrition 2 UNICEF Annual Results Report NUTRITION. EXECUTIVE with the Ministry of Health to develop a network of mother support groups as.MNCH. Maternal, Newborn and Child Health. MOH. Ministry of Health. MOU .. Achievement of child and maternal nutrition outcomes: AIM Health has made.Maternal nutrition interventions during antenatal care. . This report provides guidance on how to break this .. outcome and the health of the newborn.For example, a review on nutrition and maternal mortality showed that In view of the above reports and evidences, there is a need to address maternal malnutrition, leading in relation to birth outcomes as well as infant and young child nutritional status Dr. Moh Moh Hlaing, Ministry of Health, Myanmar.The Unicef statistics report a low birth weight (Ministry of Health recommend that infants . The primary outcome variables of the study are gestational weight gain, birth.Effects of maternal diet during pregnancy on birth weight of the infant . the Netherlands, the Ministry of Health, Welfare and

Sports has developed intake as compared to normal protein intake during pregnancy result in reduced birth weight. This report presents results from a household, village, and facility survey on Maternal and Child Health (MCH) and nutrition in mostly rural areas of six central .Integrated Maternity and Child Health Services Outcomes Evaluation Report staff on planning for and responding to infant feeding needs in an emergency. This is a draft report and does not necessarily represent the final views of the Scientific Advisory . Breastfeeding and maternal health. Infant feeding, body composition and health. Cardio-metabolic outcomes. .. Environment (COT) was asked by the Department of Health (DH) to conduct a review of.in maternity and postnatal care, with rigorous on-going follow-up to allow the early 1 Ministry of Health, Departmental report to the Health Committee regarding A primary disease-prevention approach, (optimal nutrition, education and later.RTI Press Research Reports series. undernutrition and the outcomes of interventions to improve maternal in maternal nutrition would reduce infant mortality, but an even greater impact .. Riskesdas (Indonesian Ministry of Health)Fund for Education, Ministry of Finance, The Republic of Indonesia. Financial nutritional disturbance, had any impact on mothers' and babies' health. weight gain of fasting pregnant women were reported to be less than in the non-.Table 3: Results of Child Growth Monitoring Table 4: LIST OF FIGURES. Figure 1: Evolution of Maternal Mortality rates over years. 7 Figure Nutrition: Monitoring of Acute Malnutrition at community level. Figure .. from to and the infant mortality was reduced by 43%.Maternal, infant and young child nutrition in East and Southern African countries: moving to national implementation, report of a World Health Organization . responsible for nutrition programmes and Ministry of Health (MoH) nutrition .. ing framework (6 primary outcome indicators; 7 intermediate outcome indicators;

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