Diet diversity among pregnant women and young children—Insights for improving malaria, family planning, and maternal and child health outcomes in northwestern Nigeria through social and behavior change programming

Breakthrough RESEARCH

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This brief provides rigorous evidence-based insights to policy makers, implementers, and researchers of social and behavior change (SBC) programs on maternal and child nutrition during the 1,000-day period between a woman’s pregnancy and her child’s second birthday. This period is well-recognized as a foundational period for promoting optimal growth, good health, and neurological development that will benefit a child across her lifespan. This brief summarizes nutritional intake and diet diversity of pregnant women and young children during this foundational period and examines the ideational and sociodemographic factors associated with higher-quality diets.

It is one of a series of briefs that present findings from a Breakthrough RESEARCH study that uniquely captures data on a wide range of psychosocial drivers of behavioral outcomes in the areas of family planning, malaria, and maternal, newborn, and child health, and nutrition (MNCH+N) in the three northwestern states of Nigeria. The results presented in this series can inform the improvement of women and children’s health programming in Nigeria and help to achieve the objectives of the National Strategic Health Development Plan II (2018–2022), as well as support global efforts to achieve the United Nations Sustainable Development Goals.

Breakthrough RESEARCH and Breakthrough ACTION in Nigeria

Breakthrough RESEARCH and Breakthrough ACTION are USAID’s flagship SBC programs. Breakthrough ACTION in Nigeria implements SBC programming in 11 states and the Federal Capital Territory. Breakthrough RESEARCH in Nigeria conducts rigorous research to inform SBC program implementation in three of these program states (Kebbi, Sokoto, and Zamfara). Findings presented here are from a Breakthrough RESEARCH baseline study that are used for informing SBC program adaption and scale-up in Nigeria.
**Setting the Context**

A growing body of research suggests that the 1,000-day period between a woman's pregnancy and her child's second birthday is foundational for promoting optimal growth, good health, and neurological development that will benefit a child across her lifespan. Good maternal and child nutrition during the 1,000-day window is a cornerstone of this foundational period. Both before and during pregnancy, insufficient micronutrient intake can negatively affect both the woman and her newborn resulting in higher risks of pregnancy complications, maternal anemia, maternal and perinatal mortality, preterm birth, low birth weight, suboptimal fetal development, as well as contributing to long-term adverse effects on the child's health and cognitive development.

Yet, good maternal and child nutrition remains suboptimal in Nigeria. The 2018 National Nutrition and Health Survey showed that the prevalence of malnutrition among women and children remains high with approximately 20% of children under 5 years underweight for age. The 2018 Nigeria Demographic and Health Survey further indicated a stunting prevalence of 37% nationwide with rates reaching over 40% in northwestern Nigeria. Previous research studies from this region also show that micronutrient deficiencies are common among pregnant women specifically for iron, folate, vitamin D, and vitamin A. Anemia during pregnancy is also a well-recognized problem in this geographic area.

The reasons for poor maternal and child nutrition in northern Nigeria are complex and multi-faceted, and previous research has linked poor nutrition to poverty, food security and reduced access to nutrient-rich foods, low female education, gender dynamics, and sociocultural norms about breastfeeding and nutrition, among other factors. More research is needed to better understand these barriers, and the ongoing exercise of the national food consumption and micronutrients survey could help fill information gaps. In addition, psychosocial influences—across cognitive, emotional, and social domains—may also play an important role in improved nutrition but there has been limited quantitative nutritional ideational research related in northwestern Nigeria or other low- and middle-income countries.

The purpose of this research brief is to summarize nutritional intake and diet diversity of pregnant women and young children in Kebbi, Sokoto, and Zamfara States, and to examine the ideational and sociodemographic factors associated with higher-quality diets. Findings will inform SBC programming on nutrition conducted by Breakthrough ACTION in Nigeria, and broader nutritional programming in northern Nigeria.

**Study Methods**

Results are based on the Behavioral Sentinel Surveillance (BSS) baseline survey conducted between September and October 2019 in Breakthrough ACTION program areas in Kebbi, Sokoto, and Zamfara States of northwestern Nigeria. Figure 1 summarizes the survey methods, and Figure 2 (next page) summarizes the definitions of dietary outcomes used in this analysis.

**Key Results**

**Low diet diversity among pregnant women especially for those living in the poorest households**

- Less than half (49%) of pregnant women consumed at least 4 or more food groups (out of 8 total) in the study area with more diverse diets (4+ food groups consumed) among pregnant women in wealthiest households (74%) than in the poorest ones (21%), and among pregnant women with any formal schooling (71%) than those with none or informal (Islamic) schooling (44%).

- Nearly all pregnant women consumed grains, white roots, tubers, and plantains in the previous 24 hours (98%) with about three out of five pregnant women also consuming beans or nuts (59%), and green leafy vegetables (58%). Less than one-quarter consumed eggs (21%) or other vitamin-A rich foods (24%), with significant differences across wealth quintiles and by formal school attendance (Figure 3, next page).

![FIGURE 1 BSS BASELINE SURVEY METHODS](image-url)
Sociodemographic factors and knowledge of complementary feeding timing associated with higher diet diversity in children 6–23 months

- Less than one-third of children aged 6–23 months had a minimum diet diversity (defined as consuming 5+ food groups in the past 24 hours), with no significant difference among breastfed and non-breastfed children.

- Most children aged 6–23 months were given breastmilk (88%) as well as grains, white roots, tubers, or plantains in the previous 24 hours (76%). Yet less than half were given dairy (47%), and beans or nuts (43%). Approximately one-third or fewer were given meat (34%), other vitamin-A rich foods (29%), other fruits or vegetables (21%), or eggs (21%) (Figure 4, next page).
In regression analyses, several sociodemographic factors were significantly associated with consuming a minimum diet diversity among children aged 6–23 months (Figure 5, next page). There was higher likelihood of receiving a minimum diet diversity if the child aged 6–23 months lived in the wealthiest household (1.9 times more likely than the poorest household), had a mother with any formal education (1.2 times more likely than mothers with no formal education), or was aged 12–23 months (1.6 time more likely than children aged 6–11 months). In addition, women who knew that six months was the ideal age to introduce complementary foods were 1.2 times as likely to give their child a minimum diet diversity compared with women without such knowledge.

• In regression analyses, several sociodemographic factors were significantly associated with consuming a minimum diet diversity among children aged 6–23 months (Figure 5, next page). There was higher likelihood of receiving a minimum diet diversity if the child aged 6–23 months lived in the wealthiest household (1.9 times more likely than the poorest household), had a mother with any formal education (1.2 times more likely than mothers with no formal education), or was aged 12–23 months (1.6 time more likely than children aged 6–11 months). In addition, women who knew that six months was the ideal age to introduce complementary foods were 1.2 times as likely to give their child a minimum diet diversity compared with women without such knowledge.

Half of children 6–23 months received a minimum meal frequency based on their age and breastfeeding status

• Only half (50%) of children 6–23 months received a minimum meal frequency according to their age and breastfeeding status including 48% and 54% for breastfed children 6–8 and 9–23 months, respectively, and only 31% of non-breastfed children aged 6–23 months (Figure 6, next page).

• In regression analyses, several sociodemographic factors were significantly associated with receipt of a minimum meal frequency (Figure 7, next page). There was a higher likelihood of a child receiving a minimum meal frequency if they lived in a wealthier household, had a mother or father who worked outside the home, had an older mother, or were 12–23 months (compared to 6–11 months). Surprisingly, women who believed that the first breastmilk after birth (colostrum) is bad milk were 1.2 times as likely to feed their child 6–23 months a minimum meal frequency compared with those without this belief, and this result merits further qualitative exploration.

Programmatic implications

✓ Household wealth and mother’s employment were significantly associated with consuming a minimum diet diversity, reinforcing the importance of household wealth and its association with lower quality diets. Nutritional programs may need to target the poorest households to reach those children who are less likely to consume a minimum diet diversity.

✓ Women’s knowledge about the timing of the introduction of complementary foods was also associated with their children consuming a minimum diet diversity, indicating a role for SBC programs to provide nutrition education/counseling to women and their spouses in order to raise awareness about breastfeeding and nutritional recommendations in addition to other actions to improve children’s dietary intake, such as providing nutrition education/counseling to women and their spouses.
**FIGURE 6 ABOUT HALF OF CHILDREN AGED 6–23 MONTHS CONSUMED A MINIMUM MEAL FREQUENCY FOR THEIR AGE AND BREASTFEEDING STATUS, BY STATE**

Percentage of children aged 6–23 months living in the study area who consumed a minimum meal frequency for their age and breastfeeding status in the past 24 hours, by state

<table>
<thead>
<tr>
<th>State</th>
<th>Breastfed 6–8 months</th>
<th>Breastfed 9–23 months</th>
<th>Non-breasted 6–23 months</th>
<th>Children 6–23 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kebbi</td>
<td>47%</td>
<td>58%</td>
<td>50%</td>
<td>65%</td>
</tr>
<tr>
<td>Sokoro</td>
<td>46%</td>
<td>49%</td>
<td>36%</td>
<td>47%</td>
</tr>
<tr>
<td>Zamfara</td>
<td>48%</td>
<td>54%</td>
<td>24%</td>
<td>49%</td>
</tr>
</tbody>
</table>

Note: Minimum meal frequency is defined as 2+ and 3+ meals per day for breastfed children 6–8 months and 9–23 months, respectively, and 4+ meals per day for non-breastfed children 6–23 months.

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**FIGURE 7 SOCIODEMOGRAPHIC AND IDEATIONAL FACTORS SIGNIFICANTLY ASSOCIATED WITH CHILDREN 6–23 MONTHS CONSUMING A MINIMUM MEAL FREQUENCY**

Predicted probabilities of consuming a minimum meal frequency among children aged 6–23 months living in the study area

Notes: Predicted probabilities of consuming a minimum meal frequency among children aged 6–23 months is derived from mixed-effects logistic regression models adjusted for sociodemographic and nutrition-related ideational factors (Annex 1). All variables presented were significantly associated with the outcome at the <0.05 level. Minimum meal frequency is defined as 2+ and 3+ meals per day for breastfed children 6–8 months and 9–23 months, respectively, and 4+ meals per day for non-breastfed children 6–23 months.

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**FIGURE 5 SOCIODEMOGRAPHIC AND IDEATIONAL FACTORS SIGNIFICANTLY ASSOCIATED WITH CHILDREN 6–23 MONTHS CONSUMING A MINIMUM DIET DIVERSITY**

Predicted probabilities of consuming a minimum diet diversity (at least five of eight food groups consumed in the past 24 hours) among children aged 6–23 months living in the study area

Notes: Minimum diet diversity for children 6–23 months is defined as consuming at least 5 of 8 food groups in the past 24 hours. Predicted probabilities of consuming a minimum diet diversity among children aged 6–23 months is derived from mixed-effects logistic regression models adjusted for sociodemographic and nutrition-related ideational factors (Annex 1). All variables presented were significantly associated with the outcome at the <0.05 level.
Mother’s nutritional knowledge and household wealth were associated with consuming a minimum acceptable diet among young children

- Only one in five (18%) children 6–23 months had a minimum acceptable diet for their age and breastfeeding status including 8% and 19% of non-breastfed and breastfed children aged 6–23 months, respectively (Figure 8).

- In regression analyses, several sociodemographic factors were significantly associated with a child having a minimum acceptable diet (Figure 9). Women in the wealthiest households or with children 12–23 months were respectively 1.9- and 1.5-times as likely to have a child with a minimum acceptable diet than those in the poorest households or with younger infants.

- Women who knew any sign or symptom of inadequate nutrition in a child, or who knew that six months is the ideal age to introduce complementary foods were 2.2- and 1.3-times more likely to have a child with a minimum acceptable diet compared to those without such knowledge (Figure 9).

Programmatic implications

- Household wealth was significantly associated with consuming a minimum acceptable diet, reinforcing the well-known importance of economic barriers to consuming higher-quality diets. Nutrition programs may need to target the poorest households specifically with support tailored to address this economic barrier, for example, by linking to household empowerment or social safety net programs. The development of local nutritious recipes with locally affordable foods, including trainings on how to prepare such foods, could also help the poorest households in particular overcome economic barriers to improved nutrition. Multisectoral stakeholder collaborations (e.g., agriculture, health, finance, environment) are also required to address inadequate nutrition and to shape nutrition program implementation for the poorest communities.

- Women’s knowledge about the timing of introducing complementary foods and knowledge about the signs or symptoms of inadequate child nutrition were significantly associated with minimum acceptable diet among children 6–23 months, which points to a role for SBC programs to improve knowledge of these two key areas about child nutrition in addition to other actions needed to improve a child’s dietary habits.

FIGURE 8 FEW CHILDREN AGED 6–23 MONTHS CONSUMED A MINIMUM ACCEPTABLE DIET FOR THEIR AGE AND BREASTFEEDING STATUS

Percentage of children aged 6–23 months living in the study area who consumed a minimum acceptable diet for their age and breastfeeding status in the past 24 hours, by state

<table>
<thead>
<tr>
<th>State</th>
<th>Non-breastfed 6–23 months</th>
<th>Breastfed 6–23 months</th>
<th>Children 6–23 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kebbi</td>
<td>17%</td>
<td>23%</td>
<td>21%</td>
</tr>
<tr>
<td>Sokoro</td>
<td>6%</td>
<td>12%</td>
<td>19%</td>
</tr>
<tr>
<td>Zamfara</td>
<td>6%</td>
<td>21%</td>
<td>22%</td>
</tr>
</tbody>
</table>

Note: Children aged 6–23 months are considered to have a minimum acceptable diet if they meet the criteria for both minimum diet diversity and minimum meal frequency based on their age and breastfeeding status.

FIGURE 9 SOCIODEMOGRAPHIC AND IDEATIONAL FACTORS SIGNIFICANTLY ASSOCIATED WITH CHILDREN 6–23 MONTHS CONSUMING A MINIMUM ACCEPTABLE DIET

Predicted probabilities of consuming a minimum adequate diet among children aged 6–23 months living in the study area

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>12–23 months</td>
<td>19%</td>
</tr>
<tr>
<td>6–11 months</td>
<td>13%</td>
</tr>
<tr>
<td>Highest</td>
<td>25%</td>
</tr>
<tr>
<td>Fourth</td>
<td>20%</td>
</tr>
<tr>
<td>Middle</td>
<td>16%</td>
</tr>
<tr>
<td>Second</td>
<td>12%</td>
</tr>
<tr>
<td>Lowest</td>
<td>14%</td>
</tr>
<tr>
<td>Knows timing for complementary food introduction</td>
<td>21%</td>
</tr>
<tr>
<td>Other response</td>
<td>16%</td>
</tr>
<tr>
<td>Knows signs of inadequate child nutrition</td>
<td>18%</td>
</tr>
<tr>
<td>Other response</td>
<td>8%</td>
</tr>
</tbody>
</table>

Notes: Children aged 6–23 months are considered to have a minimum acceptable diet if they meet the criteria for both minimum diet diversity and minimum meal frequency based on their age and breastfeeding status. Predicted probabilities of consuming a minimum acceptable diet among children aged 6–23 months is derived from mixed-effects logistic regression models adjusted for sociodemographic and nutrition-related ideational factors (Annex 1). All variables presented were significantly associated with the outcome at the <0.05 level.
Conclusions

The results presented in this brief indicate that dietary diversity and higher-quality diets during the 1,000-day foundational period between pregnancy and a child’s second birthday are largely associated with sociodemographic factors including household wealth, maternal and spousal employment, and maternal and child age. Indeed, poverty is a well-recognized barrier to consuming more nutritious and diverse foods, and this economic driver is reinforced by current study results for northwestern Nigeria. Moreover, while the poorest households fared worse in nutritional outcomes than wealthier ones in our analysis, few families in this region—rich or poor—exhibited high-quality and diverse diets needed for this foundational period.

Nutrition programs working in northwestern Nigeria may need to focus on addressing economic barriers to poor nutrition, such as by linking the poorest families to household empowerment or social safety net programs. In addition, the development of local nutritious recipes with locally affordable foods, including trainings on how to prepare such foods, could also help the poorest households in particular overcome economic barriers to improved nutrition. Finally, multisectoral stakeholder collaborations (e.g., agriculture, health, finance, environment) are also required to address inadequate nutrition and to shape nutrition program implementation for the poorest communities.

At the same time, we also found that maternal knowledge of the timing to introduce complementary foods and knowing the signs or symptoms of inadequate child nutrition were significantly related to better dietary outcomes in children aged 6–23 months. This points to an important role for SBC programs to increase knowledge on these two areas about child nutrition among mothers and families while also working to break down other barriers. Also, providing nutrition education/counselling among women and their spouses at the community level is essential in addition to other actions needed to improve nutritional intake during the 1,000-day foundational period.

Importantly, our baseline survey collection focused on ideational factors related to breastfeeding rather than child nutrition, so the lack of significance for many ideational variables in our study may be related to this data collection limitation. In view of this limitation, the midline survey will include additional nutrition ideational questions and data collection harmonized with the latest diet diversity indicator for women of reproductive age (MDD-W). We will therefore conduct more in-depth nutrition analyses based on these new data from the next survey round.

Annex 1: Nutrition-related ideational metrics

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>DOMAIN</th>
<th>LIKERT-SCALE STATEMENT OR QUESTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cognitive</td>
<td>Knowledge</td>
<td>In your opinion, what is the ideal age to begin introducing complementary foods in addition to breastmilk?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>In your opinion, what are the benefits, if any, for mothers who exclusively breastfeed their infant for the first 6 months of life?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How can a mother recognize that a child is not getting enough nutrition in his/her diet?</td>
</tr>
<tr>
<td></td>
<td>Beliefs about breastfeeding</td>
<td>Breastmilk contains all the nutrients a baby needs during the first 6 months of his/her life.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>A mother’s breastmilk immediately after birth is bad milk.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It is important for mothers to only give their child breastmilk during the first 6 months after birth.</td>
</tr>
<tr>
<td>Emotional</td>
<td>Self-efficacy</td>
<td>How confident are you that you could exclusively breastfeed your child for the first 6 months of life?</td>
</tr>
<tr>
<td></td>
<td></td>
<td>How confident are you that you could start a conversation with your husband/partner about breastfeeding your child?</td>
</tr>
<tr>
<td>Social</td>
<td>Social influence</td>
<td>Besides yourself, who else may influence your decision about whether to breastfeed or not?</td>
</tr>
<tr>
<td>Intensions</td>
<td>Intentions</td>
<td>How likely are you to exclusively breastfeed your newborn for the first 6 months of life, that is, only give your infant breastmilk, not even water, for the first 6 months of life?</td>
</tr>
</tbody>
</table>
References


Acknowledgments

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Our project turns evidence into action by providing thought provoking guidance to improve SBC policy and programming, with the goal of improving the cost-effectiveness of USAID’s health and development strategies. Breakthrough RESEARCH catalyzes SBC by conducting state-of-the-art research and evaluation and promoting evidence-based solutions to improve health and development programs around the world. Breakthrough RESEARCH is a consortium led by the Population Council in partnership with Avenir Health, ideas42, Institute for Reproductive Health at Georgetown University, Population Reference Bureau, and Tulane University.