

Quality Attributes in Child Food Packaging Design: Photovoice Study with Beninese Mothers

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ABSTRACT

Child malnutrition is a significant predicament in Benin, with 32% of children under the age of five being stunted and 5% wasted. The artisanal production of affordable, tasty, and nutritious baby food by local women entrepreneurs has the potential to mitigate this issue. Nevertheless, appropriate, professional and attractive packaging is necessary to reduce spoilage and gain access to markets in both urban and peri-urban areas. The aim of our investigation was to identify items that could potentially convey affirmative quality characteristics on the packaging of infant formula for mothers. To achieve this, we conducted a photovoice study in the Parakou community, situated in northern Benin, with 15 mothers of children below the age of five. The photovoice methodology delineates the experiences and perceptions of the participants through photographs. The findings indicated that thirteen photographs of various elements, including nature (fruits, trees, gardens), people (babies), and utensils, had a positive value for the mothers. However, it still needs to be determined whether the depiction of these elements or their derivatives on the packaging of children's food would generate interest and instill confidence in mothers to accept artisanal child food products. This could become a competitive advantage for local producers of infant foods in the face of competition from imported products.

Keywords: *Child food, packaging design, malnutrition, photovoice, Benin.*

1 Background

Child malnutrition continues to be one of the most significant public health issues of the century in numerous countries, particularly in the developing world. In fact, as of 2020, over 200 million children under the age of five were impacted by different forms of malnutrition in African nations (Unicef, 2020). In Benin, 5% of children under five suffer from wasting, while 32% experience stunting (National Institute of Statistics and Economic Analysis (INSAE) & ICF, 2019). More than 60% of children under the age of five in Benin are anemic, with over 60% of these cases attributed to iron deficiency (World Health Organization -WHO-, 2012). Notably, there are significant disparities between rural and urban regions and areas in terms of anemia prevalence. Numerous interventions have been implemented worldwide to address the pervasive issue of malnutrition, which is considered one of the most pressing challenges of our time. In the case of Benin, a total of 106 projects and programs aimed at direct health and nutrition actions were implemented between 1987 and 2017 (World Food Program -WFP-, 2018).

Despite these extensive efforts, nutrition indicators continue to exhibit unsatisfactory outcomes. The causes underlying this predicament are manifold and complex (Unicef, 2020; Young, 2020), with a children food environment that faces challenges of affordability and continued availability of nutritious foods (Dogo *et al.*, 2023). Given the financial constraints faced by these communities, the affordability of nutritious food remains a grave concern. In light of this, promoting local artisanal production of nutritious foods by processors and entrepreneurs emerges as a pertinent and effective option. Moreover, empowering and targeting women in this context holds great promise for improving child health (Gillespie & van den Bold, 2017, Asogwa *et al.*, 2017) as women typically assume the responsibility for processing traditional food products (Franz *et al.*, 2014).

However, the processing of traditional food products by women remains at the artisanal stage, leaving the nutritional quality and packaging of these foods uncompetitive with imported foods (Dimaria *et al.*, 2018). Several issues are associated with packaged imported child food in Benin and West Africa as a whole (Dimaria *et al.*, 2018; Reardon *et al.*, 2021). Packaged imported child food may not meet local dietary habits and preferences. This can result in inadequate nutrient intake, which can contribute to malnutrition and poor health outcomes. Also, affordability is a problem. Packaged imported child food can be expensive, making it difficult for low-income families to access. This can lead to a reliance on less nutritious, cheaper alternatives, which can further exacerbate nutritional deficiencies and poor health outcomes. Further issues relate to the sustainability of imported packaged child food. These foods can create a dependency on external food sources and undermine local food systems (Vroegindewey *et al.*, 2021). This can have negative economic and environmental impacts in the long term. Furthermore, safety and quality of packed child food can be challenging. Imported packaged child food may not be subject to the same domestic quality and safety standards as locally produced foods. In addition, there might be a lack of cultural appropriateness. Packaged imported child food may not be culturally appropriate, with unfamiliar flavors, textures, and ingredients that may not be accepted or desired by children and their families. This relates also to marketing practices (cf. Doherty *et al.* 2022; Pereira-Kotze *et al.* 2022). The marketing of packaged imported child food may create unrealistic expectations and promote unhealthy eating habits, leading to overconsumption of processed foods and sugary drinks. Overall, the problems associated with packaged imported child food in West Africa highlight the importance of developing locally produced and culturally appropriate foods that meet the nutritional needs of children while also promoting economic and environmental sustainability.

In a globalized trade context, the attractiveness and competitiveness of traditional nutritious foods produced by local women's groups and small-scale processors requires appropriate, professional and attractive packaging (Stobaugh *et al.*, 2017; Nefumbada, Dzinamarira and Mashamba-Thompson, 2021; Oladiran *et al.*, 2020). Food packaging plays an important role in the acceptability and adoption of new foods and promotes food labelling; food labelling can help to mark healthy or highly processed foods or foods high in sugar or fat. Food labelling can thus play a key role in promoting healthy diets and combating non-communicable diseases (Silva *et al.*, 2016; Todd *et al.*, 2021). Packaging is the first visual contact element for the consumer and plays a key role in the choice of food by giving a representation of the quality of the product (Gómez, Martín-Consuegra and Molina, 2015; Fenko, 2019). It is an integral part of marketing and plays a role of advertising and informing of the consumer in addition to the role of protection (Elliott and Truman, 2020).

In the context of child malnutrition, this study aims to identify elements that can effectively communicate positive quality attributes on child food packaging for mothers. A photovoice methodology is employed to make recommendations for designing attractive packaging that inspires mothers' confidence as purchasers of nutritious foods for children under five.

2 Data and Methods

2.1 Study area

This study was conducted in the Municipality of Parakou, located in northern Benin (9.3467°N, 2.6090°E). The northern departments of Benin exhibit a higher prevalence of malnutrition compared to the national average and are characterized by arid regions that are susceptible to food production challenges (Hafida, 2016). Parakou was selected as the study area due to its status as the primary city in northern Benin, with a population of 255,478 inhabitants (National Institute of Statistics and Economic Analysis -INSAE-, 2016). The city offers a diverse range of socio-cultural groups, providing a variety of design elements to consider. Moreover, urban and peri-urban populations in Parakou are more accustomed to purchasing packaged children's food, in contrast to rural areas where communities rely on subsistence food obtained through farming and harvesting (Downs et al., 2020 ; HLPE, 2018 ; Ahmed & Herforth, 2017).

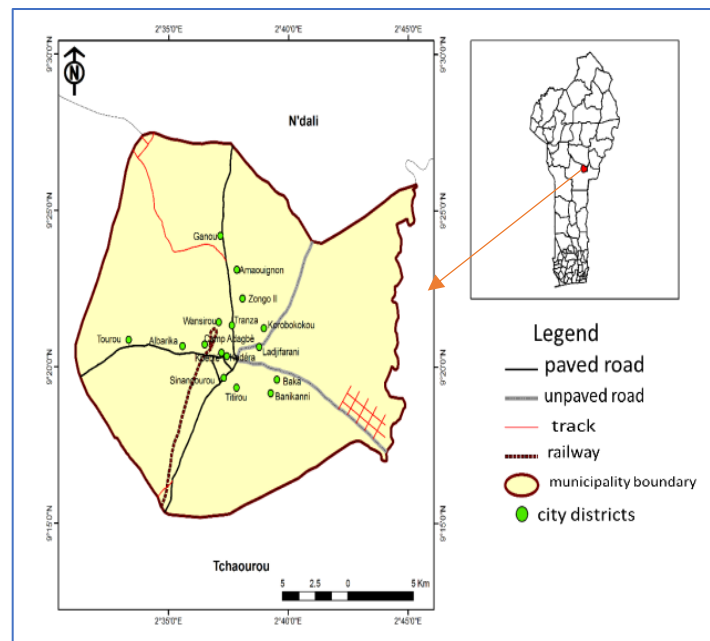


Figure 1. Study area of Parakou in Northern Benin in West Africa

2.2 Study design

A qualitative study was designed using photovoice's methodology involving women mothers of children under the age of five. The photovoice methodology is a participatory action research method that allows communities to reflect on the realities of their community in order to discuss local knowledge and considerations to drive new dynamics and policies (Wang, 1999). It captures, selects and discusses the perceptions and experiences of mothers that are often different from those of researchers (O'Halloran *et al.*, 2021; Wang and Burris, 1997). In the design of children's food packaging where mothers are the ultimate purchasers, taking in to account their perceptions and experiences could be a way to enhance the desirability and adoption of locally produced nutritious foods.

2.3 Women recruitment

Fifteen mothers of children under five years of age were recruited by consent according to the snowball method (Noy, 2008) to participate in the study. The first mother was identified in a health center for vaccination of children in the commune of Parakou. This mother referred the second mother to us and so on. The study project was presented to the mothers and those who accepted the participation criteria were enrolled in the study. Inclusion criteria were:

- Being a mother of children under five who buys packaged baby food;
- Be willing to share their knowledge on nutrition with other mothers of children;
- Have a cell phone that can take pictures;
- Give consent to participate in the study.

Exclusion criteria

- Women mothers not purchasing packaged baby food
- Women mothers who have not received consent from their husbands

2.4 Data collection

The women were invited to the Food Science Laboratory for information sessions and focus group discussions in December 2022. The photos were taken in the living environment of mothers in the Municipality of Parakou in December 2022.

Introductory photovoice study session

The introductory photovoice session was conducted with the recruited mothers to familiarize them with the concept of the photovoice study and the significance of capturing elements that represent "**something positive quality**" for them. During this session, sample images were shown to the mothers, and discussions revolved around the following questions:

- What does the image/element mean to you personally?
- How would you interpret or perceive it if you saw it on a child food package?
- How would it make you feel?
- What would it symbolize or represent in that particular context?

In addition to these discussions, general instructions were provided on how to take photos effectively, ethical guidelines for capturing images, and the use of smartphones for photography purposes. The aim was to ensure that the mothers understood the objectives and guidelines of the photovoice study and felt comfortable and confident in capturing meaningful images.

Pictures taken by mothers

The mothers were given a period of one week to take photos of various objects or things in their environment that they perceived as representing "**quality**" or something positive. They were instructed to capture images that resonated with them personally. Once the photos were taken, they were sent to the research team through WhatsApp for further processing. The research team received the digital photos and proceeded to print them for use in the subsequent session and discussions.

Second focus group discussion

A session was conducted with the mothers to discuss the photos they had taken and select images for potential inclusion in the design of future child food packages. Each participant had the opportunity to explain their selection process for choosing specific objects to photograph and the reasons behind their choices. The photos were then affixed to the wall, allowing each mother to identify her own photographs and share additional insights:

- They explained why they chose to photograph each object.
- They elaborated on how and why the photographed object represented quality or something positive for them.
- They discussed the significance that the photographed object held for them personally.

After the initial discussion, all the photos were spread out on the floor, and the participants were instructed to group them according to their own criteria. The participants then explained the reasoning behind the groups they formed. Subsequently, the participants were asked to individually select the photos they believed could be used on children's food packaging. They provided reasons for their choices, which were recorded in a notebook, and the session was audio-recorded using a smartphone. These qualitative data were later tabulated and analyzed through synthesis and transcription methods.

3 Results

3.1 Characteristics of mothers

All the participants in the study were mothers who had at least one child under the age of five. Each mother reported purchasing packaged food for their child, with varying frequencies (as shown in Figure 2). Sixteen different types of children's food were identified as the most commonly purchased items in the market. Among these, cookies (across all

brands) and "Cerelac infant cereal" (Nestlé) were the most frequently mentioned by the mothers, with average purchase frequencies of 2.28 and 1.89 times per week, respectively.

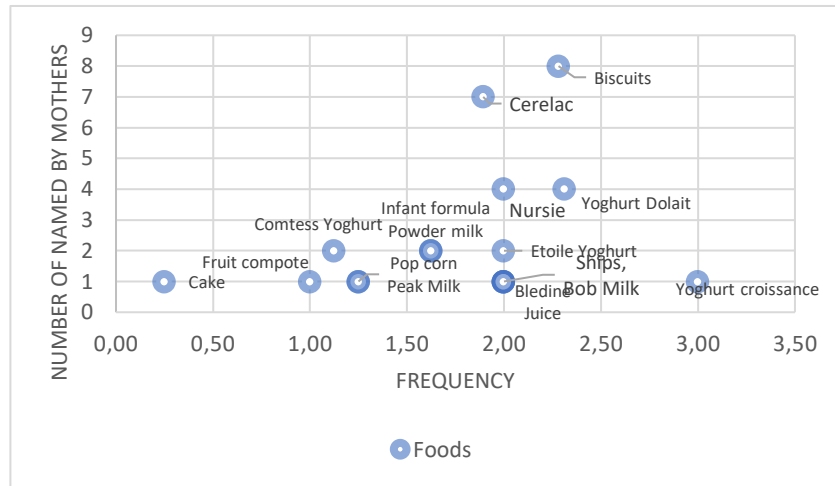


Figure 2. Feed purchased by mothers and mean frequency of purchase per week

3.2 Group of items photographed by mothers

A total of 65 photographs showcasing various objects were captured by the participating mothers. These photographs were then categorized into nine groups based on the nature of the objects depicted and their intended use. Among these groups, the patterns of African cloths and natural objects such as plants, flowers, and trees were the most prominently represented, with each group consisting of 15 photos. The household utensils category followed closely behind with nine photos (Figure 3).

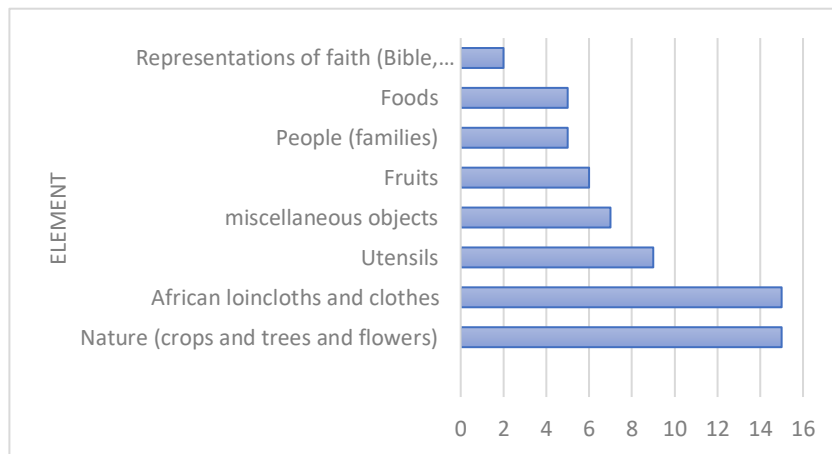


Figure 3. Grouping of photos in categories

3.3 Selected items and mothers' quality perceptions

Out of the 65 displayed photos, the participants selected a total of 13 photos that they believed represented something positive or of high quality, which could be incorporated into the design of child food packaging (Appendix).

4 Discussion

The aim of this qualitative photovoice approach study was to identify the elements that could potentially communicate positive quality attributes on child food packaging for mothers. The study identified items of positive value to mothers that would be trust factors once on children's food packaging. The identification of these elements is an added benefit for local processors to design competitive child food packaging in a market dominated by imported child food (Dimaria et al., 2018).

The study identified 16 baby packaged foods commonly purchased by mothers and 13 items that represent something positive or have some positive value for women in their environment. The 13 items identified as having positive quality attributes by mothers are mainly people, fruits, and household utensils. The represented people are grandparents and children who are apparently well. This choice may seem significant in the context of children's food. A healthy child may indeed represent a sign of good nutrition, while a grandparent expresses knowledge, wisdom and a trusting relationship. Furthermore, the choice of fruits as items of interest by women is as relevant as their role in the diet and nutrition of children. Indeed, it is known that fruits and vegetables are excellent sources of essential vitamins and minerals in the nutrition of children (WHO & FAO, 2014). Overall, African loincloths dominate the list of basic items (65) and account for 23%. The dominance of loincloths could be explained by the role that loincloths play for African women. The loincloth is a cultural element in sub-Saharan Africa (Bicaba, 2011). One of the participants affirmed that "*in our country, we recognize the greatness of a woman by the quality of the loincloth she wears...*". However, although the women did not select the photos of these designs as being suitable for use on child food packaging, we believe that they could be used as a background element in child food packaging design.

Our photovoice study related to child food packaging in Benin highlights several scientific values. The elements identified in our study complement the findings of Arimond *et al.*, (2015), who highlighted the importance of protection, food stability, marketing, and convenience as key characteristics to consider in package design. The elements identified in our study further enhance this list by emphasizing the desirability of packaging. Specifically, these elements serve as contextual factors, encompassing social and cultural aspects that can enhance the appeal of packaging for mothers of children. Just as warning labels can influence mothers' food choices for their children (Bopape *et al.*, 2021; Frank *et al.*, 2021; Bopape, Taillie and Swart, 2022; Tapsoba *et al.*, 2022), design elements that convey positive attributes and inspire confidence in mothers can influence their decisions and trust in a particular food product. In the context of low- and middle-income countries, where challenges persist regarding the labeling and packaging of children's food (Dimaria *et al.*, 2018), our study aligns with the work of Sweet, Jerling and Van Graan, (2013), and provides complementary elements to the Codex standards for food labeling and packaging (Codex stan 1-1985).

Potential scientific values of a photovoice study related to child food packaging in Benin include the understanding cultural and social factors. Our photovoice study provides insight into cultural and social factors that influence food packaging and consumption practices of mothers in Benin. This understanding can help design more effective interventions to improve child nutrition and health outcomes. Our approach also facilitates community engagement. Photovoice engages mothers as community members in the research process, enabling them to identify and prioritize issues that affect them. Involving local communities can ensure that child food packaging become more culturally appropriate and sustainable. By asking mothers to take photos of their daily lives and experiences, photovoice can provide ethnographic insights into the lived experiences of mothers and children in Benin. This can provide a more nuanced understanding of the factors that affect food packaging choices and consumption practices. Thereby our approach improves empowerment and advocacy of mothers. The photovoice approach empowers mothers to identify and address issues related to child nutrition and health in their communities. Mothers used the photos and narratives they create to advocate for change in their food environments.

Further studies are required to assess the degree to which the identified elements enhance the desirability and food choice of products packaged with these specific design elements. The elements identified have to be included in specific packaging designs and various specifications have to be tested. Professional packaging designers should be included in the respective research and development processes. Also, possible combinations of elements on packaging should be analyzed and how they interact. To get a deeper understanding of the attractiveness of specific design elements, eye-tracking could be employed to test and compare different packaging variants or to compare a new packaging design with existing packaging designs. Research should focus on developing and testing packaging designs of artisanal child food products in order to strengthen local food systems.

Our study is not without limitations. Our results should be limited to the North-Benin zone, by the number of participants (15), and also by socio-economic status of women. Further studies should recruit participants from a more diverse background to allow more general conclusions. Recruitment processes should employ broader quota criteria to ensure representation of relevant women segments in society.

5 Conclusion

Although this is a pilot study, it provides relevant information for artisanal, local entrepreneurs producing children's food who are venturing into a globalized market. We have identified quality items perceived by Beninese mothers of children who are the purchasers of food for children. The items that represent the qualities for mothers are diverse. They are, among others, confidence, well-being, usefulness, health, contents related to the health of their children. These elements have the potential to enhance the desirability of children's food packaging within the socio-cultural context of mothers. Moreover, they can facilitate product marketing of packaged traditional infant food, which has traditionally been the primary means of creating desirability for the food being sold. Taking these elements into account

in the design of future artisanal, infant food packaging would increase the confidence of mothers and promote the acceptance of these foods.

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Appendix: Quality perception on the selected photos by mothers

Photos



Quality perception by mothers

"Seeing my grandfather and son together with a wide smile and that confidence that the son exudes gives me joy in life. Seeing a similar image on a child's food package will create confidence and trust in me. It expresses a trust between the manufacturer and the woman. Using it would be a guarantee of good health for my child and therefore a happiness for me."

Photo 1: A son and his grandfather



"Fruit is an expression of good health. Seeing them on the packaging of children's food means that this food is also good for the health of the child. In addition, pineapple is a fruit that makes Benin proud internationally. "

Photo 2: Pineapple and watermelon



"We traditionally use jars to keep water in our homes. This big plastic came to replace them in the people who are rich. It takes over a symbol of prestige. To see it on a package of food for children represents for us something good, common and practical. "

Photo 3: Large plastic



"This plastic is necessary and practical to serve water. On a child food packaging, it expresses something common and good for us."

Photo 4: Plastic to serve water

Photos



Quality perception by mothers

“Oranges are the first fruit to be squeezed before the other foods are given to the children. It is known that oranges contain a lot of vitamins. On a package for children's food, it means that this food is rich in vitamins and good for the health of children.”

Photo 5: Oranges display



“We see a woman in a vegetable garden. It is so beautiful! It shows the work that women do to feed the family. The garden is a source of healthy vegetables. On a package of baby food we think it is natural food; and everybody wants natural and healthy food for their child.”

Photo 6: Women in vegetable garden



“It is recommended to give chicken meat to children. Seeing this picture on a child's package means something natural and good for the growth of children.”

Photo 7: Children guarding roosters



“The banana is a fruit rich in vitamins and minerals that is recommended for the health of all. Seeing it on a child's food package means that this food can help children to be healthy and grow normally.”

Photo 8: Banana



“Papaya is a fruit recommended for digestion and rich in vitamin A which is good for vision. This tree contains a lot of fruit which is a sign of abundance and fullness. On a package of food for children can mean a rich and complete food.”

Photo 9: Papaya tree

Photos

Quality perception by mothers



“A woman in the kitchen shows that women take care of the house. Seeing it on a package highlights the role of women as artisans in child nutrition”

Photo 10: Woman cooking



“It is a well-presented fruit salad. On a child's foods package, it shows that this food contains many vitamins and minerals good for children's health. It is also attractive.”

Photo 11: Fruit salad



“It is a wild fruit very loved by children. On a child's food package, means that the food is locally produced”

Photo 12: Wild fruit



“This photo shows a smiling and healthy child. On a child food package, it means that this food is good for the health of children. It shows women the result they will get after using the food.”

Photo 13: A child