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Sanitation and Hygiene Applied Research for Equity

Complementary Food Hygiene

An overlooked opportunity in the WASH, nutrition and health sectors

POLICY BRIEF

Mothers publically committing to practise food hygiene behaviours in the Nepal intervention-study. Credit: LSHTM/Om Prasad Gautam

Summary

Poor complementary food hygiene may account for a substantial proportion of diarrhoeal diseases among infants and young children in developing countries, which in turn are responsible for a large share of the global burden of infectious disease. However, most of the information on food hygiene in developing countries derives from expert opinion and biological plausibility rather than robust epidemiological evidence. This briefing paper documents the Sanitation and Hygiene Applied Research for Equity (SHARE) consortium's contribution to narrowing the evidence gap, highlights opportunities for future research, and offers insights that could influence policy and improve programming in the water, sanitation and hygiene (WASH), nutrition and health sectors globally.

SHARE Consortium

The SHARE consortium is a five year initiative (2010-2015), funded by the UK Department for International Development, which seeks to contribute to accelerated progress on the Millennium Development Goal sanitation target by generating critical knowledge to inform policy and practice in the areas of sanitation and hygiene.

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Complementary foods: a key disease transmission pathway

Diarrhoeal diseases are the second leading cause of death for children under the age of five globally [1], and kill more young children than AIDS, malaria and measles combined [2]. They also increase the risk of malnutrition [3, 4], which itself accounts for almost a quarter of the global disease burden for children under the age of five. It should be noted, however, that diarrhoeal diseases are not the only factor in the causal pathway between faecal contamination and undernutrition; malabsorption, caused by environmental enteropathy and nematode infections, also plays a role [5].

Contaminated complementary foods may account for a substantial proportion of diarrhoeal diseases among infants and young children in developing countries [6]. While it is important for an infant's development to supplement breast milk with appropriate solid foods from six months, unhygienic preparation and feeding of complementary foods exposes infants in low income settings to pathogens of faecal origin. There is evidence that the incidence of diarrhoeal disease is higher in children after weaning is initiated [7]. In fact, in low income settings, the level of contamination in complementary foods can be higher than in drinking water [8], though this varies between environmental settings [9-11]. Furthermore, children under the age of six months may also be exposed to such pathogens as a result of non-exclusive breastfeeding [12].

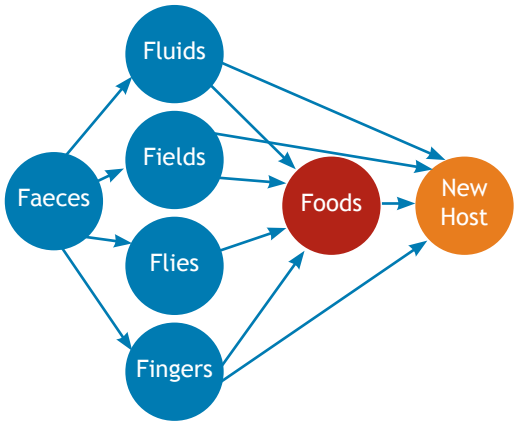

Figure 1: 'F' diagram illustrating transmission pathways.
Credit: Om Prasad Gautam

Interventions to improve public health have not adequately addressed the food contamination pathway. The nutrition sector has traditionally placed greater emphasis on 'nutrition specific' than on 'nutrition sensitive'[1][13] interventions, and therefore the evidence base on the impact of the latter on tackling the underlying determinants of foetal and child nutrition and development is limited. Meanwhile, although hygiene is high on the agenda in the WASH sector, interventions have often been limited to hand washing with soap.

1 'Nutrition-specific' programmes address the immediate determinants of foetal and child nutrition and development, whilst 'nutrition-sensitive' programmes address the underlying determinants.

There are several reasons for this neglect:

- Health institutions tend to prioritise vertical disease management programmes over horizontally integrated public health efforts such as prevention programmes;
- The nutrition sector places greater emphasis on dietary intake than on food hygiene;
- There is a lack of evidence on the effect of food hygiene interventions on child health outcomes; Guidance on best practice for securing sustainable food hygiene behaviour change in various settings is lacking.

The evidence base

There is evidence to suggest that unhygienic food preparation and feeding is likely to increase the level of microbiological contamination in food and the risk of diarrhoeal disease [6, 8, 14, 15]. There is also some evidence identifying risk factors and associated behaviours. However, little is known about food hygiene practices in low income settings or about interventions that could mitigate the risks [16].

What We Know

Studies to date have focused on the factors that may lead to food-borne contamination. These include: hot climate [8], poor storage practices, insufficient cooking time [6, 8], time elapsed between meal preparation and feeding [17, 18], and use of unsterilized and dirty feeding bottles for children [7, 8].

Expert opinion, meanwhile, suggests that risk factors for food-borne contamination include: environmental contamination due to lack of sanitation; use of contaminated water to wash serving utensils; not washing hands prior to cooking and feeding; consumption of food that has been spilled on the floor; and use of dirty cloths for wiping hands and utensils.

The hygiene practices of mothers have been found to be related to a high level of bacterial contamination of drinking water and complementary foods [19], and the home has been identified as an important location for acquiring food-borne diseases [20], due, in large part, to specific food hygiene practices [17].

We also know that improving socially or culturally engrained practices is challenging and requires going beyond purely supply-led interventions [21]. Evidence suggests that addressing the structural determinants of hygiene practices will be integral to securing sustainable food hygiene behaviour change [22, 23].

When SHARE began in 2010, effective food hygiene interventions had not been described or evaluated, though the Hazard Analysis and Critical Control Point (HACCP) approach had been used to identify points where controls could be applied to prevent, reduce or eliminate this contamination [24-27]. One study in peri-urban Bamako, Mali, had gone further and had designed

and delivered a small-scale hygiene experiment using HACCP which proved to be effective in reducing the contamination of complementary foods [24].

The evidence gap

In 2010, many aspects of the relationship between food hygiene and child health remained unclear and there was limited knowledge about how best to design and deliver interventions. Firstly, our assumptions about food-borne infections in low income settings were still largely based on expert opinion and biological plausibility, rather than data from epidemiological studies [16]. There was a need to better characterise pathogen transmission through food and to establish how this differed across settings. Secondly, it remained unclear which factors, or behaviours, posed the greatest risk of food contamination and should therefore be targeted by interventions seeking to reduce these risks. SHARE was also keen to establish how to promote such interventions in a normal community programme setting, and to identify how best to tackle multiple behaviour change.

Narrowing the evidence gap

Recognising the importance of food hygiene in the prevention and control of faecally transmitted diseases and the need to build a stronger evidence base, SHARE provided funding for three studies in Bangladesh, Nepal and the Gambia.

Bangladesh

Using the same principles employed in the Mali study and based on the results [24], SHARE funded a small intervention study to investigate whether hygiene promotion following the HACCP approach was effective in reducing complementary food contamination in Bangladesh. In the study a total of 60 households in rural Matlab, Bangladesh, were selected (30 each in the control and treatment arms). Two types of complementary foods were collected from each household and analysed for microbial contamination just after cooking and before the child was fed. Critical control points were determined, and mothers in the study households were trained for four weeks to achieve and monitor these. Results showed that the hygiene intervention significantly reduced food contamination. The study highlighted the importance of complementary foods as an exposure pathway for enteric pathogens [9]. It also demonstrated that controlling critical points of transmission can significantly reduce this exposure.

Nepal

Building on the Mali and Bangladesh findings, SHARE funded the design, delivery and evaluation of an intervention to change the food hygiene behaviours of mothers in rural Nepal [28]. This consisted of a motivational package targeting five key food hygiene behaviours using emotional drivers rather than cognitive appeals, as well as emphasis on change in behaviour settings. Four clusters received the intervention over a period of three months whilst four clusters remained a control group. Outcomes were measured in 239 households with a child aged 6-59 months. 43% of mothers were able to maintain all 5 key behaviours and the intervention was successful in significantly improving the microbiological indicators in complementary foods. The results suggest that it is possible to substantially improve food hygiene behaviour and reduce the risk of microbiological contamination of complementary foods through scalable community level interventions.

Five key food hygiene behaviours promoted in Nepal.
Credit: Om Prasad Gautam

The Gambia

An ongoing SHARE-funded cluster randomised control trial in rural Gambia build on the lessons learned from earlier SHARE-funded work on food hygiene and behaviour change, including the successful SuperAmma campaign in India [29]. It aims to substantiate the findings of the Nepal study through adaptation of the intervention to a different context. As in Nepal, it seeks to provide an intervention that can be scaled-up, this time in low income settings in Africa[1]. Formative research has been completed and the intervention is in the process of being refined.

2 The SuperAmma trial was a communication campaign based on the Evo-Eco theory of behaviour change that was carried out in Southern India to inculcate the habit of handwashing with soap. Further information about SuperAmma can be found here: http://www.superamma.org/index.html.

This package of research has plugged an important evidence gap in the sector. The studies in Mali and Bangladesh showed that food contamination can be reduced using a HACCP methodology at the household level [9]. The study in Nepal, meanwhile, successfully tested a simple and scalable food hygiene intervention targeting multiple behaviours that could be implemented in a community setting through health, WASH and nutrition programmes [28]. We await results from the Gambia study with anticipation; these should be available in early 2015.

More knowledge is still needed

These contributions to our knowledge of this important area for child health are already contributing to changes in policy and practice. In Nepal, for example, a pilot project is exploring how hygiene, including food hygiene, can be integrated into vaccination campaigns [30]. However, major knowledge gaps remain:

- Changing behaviour: Getting mothers to change long-held routine kitchen practices will always be difficult. We need clever new ways, informed by socio-ecological approaches to behaviour change – such as those piloted in Nepal - to secure sustainable food hygiene behaviour change.
- Transmission pathways: We need to fully understand each of the transmission pathways of all of the major enteric pathogens, including through complementary foods, in different settings so as to be able to better target our interventions.
- Child health: The effect of food-borne contamination on child health during the critical window of weaning and long term development needs to be better understood. In particular, the relationship between food-borne pathogens and malnutrition needs more evidence. This would inform policy at national and international levels.
- Scaling-up: Further development and testing of strategies for scaling-up complementary food hygiene interventions – such as that trialled in Nepal – are required. This would include working closely with nutrition programmes already targeting improvements in complementary feeding practices at scale and with WASH programmes where hygiene components have been included but have not specifically focussed on food hygiene. Scaling-up interventions, and the cross-sectoral collaboration associated therein, would lead to better outcomes for children and would increase the benefits from investment in nutrition, health and WASH.

Recommendations

Whilst our knowledge remains incomplete, the current state of evidence suggests that it is worthwhile investing in food hygiene and, more specifically, in carefully designed programmes to improve food hygiene behaviour. The successful improvement of safe food hygiene practices can help to reduce or eliminate complementary food contamination, resulting in the prevention or control of diarrhoea and malnutrition. The following recommendations would likely have a major impact in ensuring this:

1

Food hygiene interventions must be carefully designed based on scientific principles of behaviour change.

Evidence from other sectors suggests that simply lecturing and messaging is not effective [22] whilst programmes that creatively target emotions and the settings in which behaviour takes place are likely to be more successful [28, 29].

2

There must be better integration across the nutrition, health and WASH sectors nationally and internationally, and food hygiene should be mainstreamed.

Evidence-based international guidelines that better reflect the complex determinants of food hygiene behaviours and suggest greater cross-sectoral collaboration, are essential. Ongoing post-2015 discussions provide the perfect setting and crucial range of stakeholders required for such efforts. Guidelines formulated could then be adapted to the national context through a participatory process that engages all relevant stakeholders.

3

High quality research in this area must continue to be funded and carried out.

Additional large-scale research is needed to better understand this transmission pathway, how it affects child health and long term development, and to further test scalable behaviour change interventions in different settings.

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