Formalin: How to Address a Market Failure?

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Purpose of this report: Recent media reports have brought increased attention to the problem of wholesalers and venders treating fish and vegetables with formalin to preserve shelf life. The widespread use of formalin and other hazardous chemicals is a classic example of what economists call an "information asymmetry based market failure." In other words, wholesalers and venders have information that consumers lack, and they can use this "asymmetry" to reduce their costs and increase revenues at the price of public health. Like past news analysis, this report seeks to bring together the available information on formalin adulteration and asks how Bangladesh should respond to such a market failure?

What is formalin? Formalin is a solution made up of 37% formaldehyde by weight, which is stabilized by the addition of methanol. If used in sufficiently low quantities, it does have legitimate commercial uses, for example, to prevent bacterial growth in fish farms. Nonetheless, in larger doses or with extended exposure, formaldehyde is considered to be toxic and cancer causing.[1]

Why is it used? A laboratory study comparing formalin treated and untreated fish found that formalin treated fish stored in ice appeared in acceptable condition for a period of 28-32 days: compared with 20-23 days for non-treated fish.[2] However, these appearances were deceiving, as formalin treated fish were found to have reduced non-protein nitrogen content, protein solubility, and gel forming ability, which resulted in "poor eating quality and poor digestibility."[3]

How extensive is its use? The extent of formalin contamination is not entirely clear. Several studies have attempted to measure the intensity of the problem in Bangladeshi fish markets; however, their findings have differed substantially.

- Research undertaken and published in 2009 based on a study of four fish markets in Dhaka City found formalin contamination in only 50 of 800 fish sampled, or 6.25%. The highest percentage was found in the Karwan Bazaar market. Large Rui and Katla, were the most commonly contaminated, although formalin use was also found in a number of other fish varieties including shrimp, Mrigal, and Kachki.[4]

- A somewhat later 2010 study of two markets and three grocery stores in Dhaka found that an alarming 42% of 100 fish sampled had been treated with formalin. These included 70% of sampled Rui, 50% of Katla, 40% of Mrigal, 50% of Hilsa, and 0% of Sharputi. Contamination across the five sites ranged from 20-60%.[5]
- While percentages were not provided, a 2010 study in Mymensingh also found evidence of formalin in imported Rui and Katla but not in local varieties of the same fish. The findings were consistent across the five Mymensingh markets studied.[6]
- A 2012 study of five markets in Sylhet found formalin in 26 of 150 sampled fish, or 17.3%. Again contamination occurred across the five markets, although it ranged from 6% to 26% of fish tested. Evidence of formalin was found in Rui, shrimp, and Katla, but not Mrigal or Hilsa.[7]

These findings make clear that formalin is a common and even growing problem; however, they also suggest that it is perhaps not as pervasive as some media reports would suggest. Unfortunately, these research initiatives do not address the issue of formalin use in vegetables, and they only offer brief snapshots at a given point in time.

Not just formalin: While formalin has perhaps garnered the most media attention, it is by no means the only harmful chemical used on a large scale. Another major concern includes the use of ethylene oxide and calcium carbide to ripen fruit. A 2004 study by the Institute of Public Heath found hazardous adulterations in all types of food items tested, including sweets, curd, ghee, chana, sauce, dalda, soya bean oil, and ice cream.[8]

Governmental response: The classic solution to market failures is a governmental one. Simply put, health authorities should inspect for the use of harmful chemicals and punish those found guilty. There are, in fact, several government regulations, agencies, and initiatives in place to address this problem.

- The Pure Food Ordinance of 1959 (last revised in 2005) prohibits food alteration and the use of dangerous chemicals.
- There is a National Food Safety Advisory Council to oversee food safety policy.
- There is a Consumer Rights Protection Department, which can receive complaints from consumers.
- Each upazilla and city is to conduct inspection and enforcement drives and each district is to host a food court.

As a result, enforcement does occur and enforcement drives are often profiled in the media. For example, during a seven month period during 2010 and 2011, there were a reported 1,039 mobile court drives across the country that resulted in 1,089 cases filed, Tk23.8 million in fines, and 66 people sent to jail.[9]

While these numbers sound satisfactory, wholesalers and vendors clearly have not been deterred. A 2010 study by the Food and Agriculture Organization found major gaps in the regulatory system.[10] The report noted poor coordination among the *fifteen* ministries involved in food safety and *ten* ministries involved in food inspection and enforcement. For example,

while upazilla and city sanitary inspectors are supposed to be responsible for inspection and enforcement in their jurisdictions, in practice, local authorities still relied on the central Directorate General of Health Services (DGHS). At the time of the study, there were only twenty Dhaka City Corporation sanitary inspectors for the entire city. Furthermore, the research found that inspections were not based on clear procedures or sampling plans. Despite the popularity of mobile courts, the study concluded that "their impact on the food safety situation seems to be minimal."[11]

Clearly, improved regulations and enforcement have to be part of the solution, and recently the food ministry has proposed consolidating inspections under one agency. Nonetheless, to date the governmental response has clearly fallen short. In fact, the problem is so extensive that a strong regulatory response might be unrealistic given the current limitations of Bangladesh's regulatory institutions. Therefore, it is necessary to ask if there are other complementary and non-governmental solutions to such market failures.

Using market mechanisms to solve market failures? Amongst much praise and fanfare, the Malibagh kitchen market -- with support from the Federation of Bangladesh Chambers of Commerce and Industry (FBCCI) -- recently presented itself as a formalin free market. The idea appears to make good business sense; a recent reported stated, "customers from faraway places in the city now throng the bazaar to buy different items, especially fish." [12] The experience suggests that by offering a reliable product, traders and venders can increase their sales and their prices. Hopefully other markets and venders will follow their lead. Of course, such measures require a means to ensure that establishments are in fact formalin free. (It would be possible, for example, for wholesalers and venders to seek certifications from third party companies or organizations to certify their products.) Other critics have pointed out that a handful of formalin free markets still leaves most of the population without safe options. Nonetheless, such an initiative demonstrates that being formalin free can be profitable, and it complements and facilitates the work of government regulators.

The involvement of the FBCCI and business leaders is particularly important. While the use of formalin might benefit individual venders in the short term, it hurts the industry as a whole. For example, there is anecdotal evidence that people limit their total fish or vegetable intake out of fear of the effects of formalin. As a result, business leaders and food suppliers have an incentive to help find a solution to the problem.

A role for civil society? Recent media coverage has profiled the development of an easy to use formalin detector, which is facilitating efforts in Malibagh. While such a device would probably not be purchased by individual consumers, there is no reason why citizen groups or universities could not conduct their own monitoring. Citizen based water monitoring, for example, has become common throughout the world; and the same logic could be applied to food adulteration. There are, in fact, several citizen groups that have shown an interest in food adulteration, including the Consumers' Association of Bangladesh and Bangladesh Poribesh

Andolon (BAPA). Citizens also have a role to play in reporting suspected formalin use to the Consumer Rights Protection Department.[13]

Structural solutions: While government regulation, market incentives, and civil society oversight can be marshaled to help address the problem, it is important to take a step back and consider why the food adulteration occurs in the first place. The problem probably will not be solved until there are improvements in the food supply chain – particularly the development of low cost cold storage -- to maintain the freshness of perishable goods without the use of chemicals. Of course, this begs the question: are consumers willing to pay a little extra to ensure that their food is healthy?

In summary: Food adulteration and particularly the use of formalin as a preservative appears to be widespread in Bangladesh. Despite legislation and enforcement initiatives, the government appears to be far away from a solution. While not ignoring the need for a more effective governmental response, this report asks: can market mechanisms be marshaled to help resolve the problem? Is there a role for civil society and citizens? Are there improvements that can be made to the supply chain? This report suggests that a solution to the formalin problem requires an affirmative answer to all three of these questions.

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[1] National Cancer Institute. Formaldehyde and Cancer Risk Fact Sheet. http://www.cancer.gov/cancertopics/factsheet/Risk/formaldehyde

[2] T. Yeasmin, M. S. Reza, M.N.A. Khan. F.H. Shikha and M. Kamal. 2010. "Quality Changes in Formalin Treated Rohu Fish (Labeo rohita, Hamilton) During Ice Storage Condition." *Asian Journal of Agricultural Sciences.* Vol. 2(4): 158.

[3] *Ibid,* pg. 153.

[4] Emdadul Haque and A.B.M. Mohsin. 2009. "Intensity of Formalin Use for Consumable Fish Preservation in Dhaka City, Bangladesh." *Journal of Fisheries International.* Vol. 4(3): 52-54.

[5] Riaz Uddin, Moin Ibna Wahid, Tasbira Jesmeen, Naz Nasan Huda, Kumar Bishwajit Sutradhar. 2011. "Detection of Formalin in Fish Samples Collected from Dhaka City, Bangladesh." *Stamford Journal of Pharmaceutical Sciences.* Vol. 4(1): 49-52.

[6] T. Yeasmin, M.S. Reza, M.N.A. Khan, F.H. Shikha, and M. Kamal. 2010. "Present Status of Marketing of Formalin Treated Fishes in Domestic Markets at Mymensingh District in Bangladesh." *International Journal of Biological Research*. Vol. 1(4): 21-24.

[7] M.M. Rahman, S. Ahmed, M.M. Hosen, and A.K. Talukder. 2012. "Detection of Formalin and Quality Characteristics of Selected Fish from Wet Markets at Sylhet City in Bangladesh." *Bangladesh Research Publications Journals.* Vol. 7(2): 161-169.

[8] Aasha Mehreen Main, Avik Sanwar Rahman, Shamim Ahsan, and Imran H. Khan. 2004. "Eating Away Our Health." *The Star*. Vol. 4(20): Nov. 5

[9] Md. Asadullah Khan. 2011. "Rampant adulteration still a havoc." *The Daily Star:* July 9.

[10] FAO. 2010. "Food Inspection and Enforcement in Bangladesh: Current Arrangements and Challenges." Food and Agriculture Organization of the United Nations.

[11] *Ibid.* pg. 14.

[12] Suman Saha. 2012."Formalin-Free Kitchen Market: Initiative Instant Hit." The Daily Star: Sept. 3

[13] Complaints can be made to the Director General of the department, 1 Karwan Bazar, TCB Bhaban, Dhaka. Fax: 8189425, 8189045, SMS: 01713436360, 01715205930, and 01711408790, Email:dncrp@yahoo.com.