Objective(s)

This section of the project documents the value of chocolate to human health, and weighs benefits against the disadvantages that limit its consumption. The objective extends to studying the impact of recent health-related scientific findings on the political scenario around chocolate. The focus of this investigation is the changed landscape of emerging dynamics between the industry as a whole, corporate players striving for transnational and domestic competitiveness, regulatory agency responses, and what this interplay of forces means for the consumer in the face of new scientific evidence.

SUMMARY OF FINDINGS

Introduction

Chocolate is part of almost every child’s basket of candy, and is an indulgence for most adults at least on some occasions. And so, it carries an inevitable association with sugar-based candy, which means it affects a child’s teeth, plays up moods, and gives energy which is not sustainable. The traditional view on chocolate as a form of candy or as an after-dessert rich sweet snack can largely be summed up as there is little good in it for you, except for its taste. This view has been changing somewhat in recent times. It is not that these negatives on chocolate are not entirely valid; they continue to be true of chocolate consumption even now, particularly when it is eaten in large quantities. This research report tracks a developing perception for chocolate which shifts from kids’ candy or a subject of high-calorie dessert-like indulgence, towards a food that has medically documented beneficial properties. Its changing status embodies a unique proposition that chocolate now presents as a food with health benefits, albeit in a qualified manner that requires explanation. And so, if someone were to pose me the question “eat chocolate, live longer?” that appeared recently in the New York Times Magazine,¹ I would answer by quoting Marion Nestle, “A little chocolate is delightful. A lot is not.”²

It is a matter of common knowledge, and is apparent even from general reading, that chocolate is contraindicated for those who are on a diet to limit calories. It is completely off-limits for people who suffer from impaired glucose tolerance or diabetes. This is why a
developing shift in perception of chocolate towards a food with medically documented beneficial properties assumes great significance for the chocolate industry and for the consumer. It opens up challenging marketing opportunities and spurs political realignments between stakeholders in an industry where the sales of just the top ten manufacturers worldwide touched $40 billion in 2006.³

Recent Medical Evidence

Over the years, empirical observations by medical and nutrition professionals have led to awareness that chocolate may not be simply bad for health, as has been assumed so far. Until recently, the nutritional pointers to health benefit have been nothing more than purely suggestive and anecdotal in character. In 2011, a group at the University of Cambridge published a study in the British Medical Journal (BMJ) that provides overwhelming evidence of a beneficial role for chocolate in reducing the risk of serious cardiovascular and metabolic disorders.⁴

Cardiac ailments, as well as disorders in metabolism, pose increasingly grave dangers to public health. The World Health Organization has predicted that 23.6 million people will die of cardiovascular ailments by the year 2030.⁵,⁶ One-fifth of the world’s adult population is estimated to be suffering from metabolic syndrome,⁷,⁸ which is the medical term for the deadly mix of factors that lead to cardiovascular complications and type-2 diabetes.

The report published in the BMJ⁴ is a compilation from 4576 studies conducted in the United States and Europe; studies were examined from at least nine of the largest biomedical electronic databases. Of the 4576, seven studies met the strict criteria imposed by the investigators for inter-study comparison. The health outcomes of over 114,000 patients from these seven studies were closely examined, and it was found that the consumption of chocolate was associated with 37 per cent reduction in the incidence of cardiovascular disorders, 31 per cent reduction in type-2 diabetes and 29 per cent reduction in stroke.

In the past, beneficial effects of chocolate had been observed only with regard to intermediate factors of cardiovascular disorders. This is the first time that the beneficial effects of chocolate consumption have been associated with a very significant and statistically valid reduction in the concrete outcomes of heart attack and stroke. It is all the more compelling because the outcomes pertain to a large number of adults across studies conducted by multiple investigators over six decades, 1950 onwards. The seven studies comprising over 114,000 subjects were put through the stringent norms required for pooling data and conducting meta-analysis. Two independent pairs of reviewers at the University of Cambridge critically examined the studies to determine if they met the selection criteria; any disagreement between the pairs was resolved through consensus or mediation by a third reviewer. Thus, the possibility of any bias creeping in during selection of data for inclusion in the analysis was minimized to the extent feasible. And, the basic data fed into the analysis was taken from multiple investigators anyway; the time period over which the data had been generated should help preclude bias too.

The beneficial effects observed are attributed to polyphenol compounds like flavonol present in chocolate.⁹ These compounds confer health benefits due to their antioxidant properties. Chemical entities known as free radicals cause tissue damage in the body; and polyphenol compounds like flavonol that are present in high concentration in cocoa products like
chocolate function as scavengers for free radicals. Once free radicals have been inactivated by flavonol, they can no longer attack body tissues.

The benefits that accrue from chocolate consumption are zooming in on dark rather than white or milk chocolate. A ten-year observational study at the Karolinska Institute in Sweden on 33,000 women in the age group of 49 to 83 years has shown that those who ate the most chocolate, i.e. 66.5 grams or 2.4 ounces, had a 20 per cent lower risk of developing stroke than others. The investigators are convinced that dark chocolate carries maximum benefit since it has the highest concentration of flavonol, which acts as an antioxidant and prevents oxidation of LDL-cholesterol, imparting cardio-protection.

San Diego State University researchers recently displayed thought-provoking findings to delegates at the Federation of American Societies for Experimental Biology meeting in April 2012. Using 31 volunteers assigned to eating dark or milk chocolate for just 15 days, they could show that dark, rather than milk chocolate resulted in reducing blood sugar, lowered harmful LDL-cholesterol and raised good HDL-cholesterol in this short period of time.

Scientists at the Nestle Research Center in Lausanne, Switzerland concur with their scientific peers that health benefits are higher with dark chocolate. Their findings go a step further to show that benefits are much higher when those who consume dark chocolate lead active lifestyles. Interestingly, they were able to directly demonstrate reduction in a physiological biomarker for oxidative stress and increase in free fatty acid mobilization in this group.

Cellular studies from the Johns Hopkins University and the University of Toledo suggest that dark chocolate may even protect against brain damage in the event that a stroke occurs.

Limitations and Caution

It is very important for consumers of chocolate, particularly those who eat large amounts of it, to be aware that chocolate continues to be a high-energy food rich in calories and sugar content. The energy density of 2100 kiloJoules or 500 kilocalories per 100 grams of chocolate is high enough to contribute to weight gain, which in itself is a risk factor for diabetes, for hypertension, and for cardiovascular and metabolic disorders in general.

The evidence presented by this far-reaching study by Cambridge researchers in favor of chocolate consumption is one of association, and not of causation. Further studies would be required to prove that chocolate actually causes marked reduction in the incidence of heart attacks and stroke.

The seven studies that were finally selected for meta-analysis had been conducted in the United States and Europe. Therefore, caution should be exercised in generalizing the findings and extrapolating them to populations in other geographic locations, or to ethnic groups that are genetically diverse. Generalizing the findings to other socioeconomic groups should also be handled cautiously.

The authors recognize that the considerable heterogeneity in the data they had to deal with prevented them from attempting to estimate a dose-response relationship between the
amount of chocolate consumed and its effect in quantitative terms on the degree of risk reduction in cardiovascular and metabolic outcomes. Among other avenues for investigation that the field unfurls, the possibility of developing a dose-response relationship sometime in the future is an attractive research goal that can go a long way in consolidating the position of chocolate closer to the category of a food that can provide dose-dependent beneficial effects. “Dose adjustment” of chocolate could conceivably be one of the ways to manage the calorific input in the event that chocolates were to be consumed for health benefits.

Notwithstanding the limitations and cautionary note listed above, it would be reasonable to assess that chocolate is already on the fast track of a candidate that can be developed for prevention of cardiovascular and metabolic disorders.

**The Aftermath of Scientific Evidence: Responses and Politics**

One could have expected that after the overwhelming suggestion from the BMJ study that begs commercial exploitation of the findings, chocolate manufacturers may have jumped into the fray with product benefit claims. However, they have been very cautious in making claims even though the health benefits of dark chocolate have emerged so strongly, and the indicative benefits highlighted by the BMJ association study are being increasingly supported by more recent research findings. Of course, the scientific evidence is not ironclad as yet. A likely reason for the reticence of chocolate companies could be the fact that functional foods have rarely been marketing successes so far. Even giants like Nestle and Campbell have failed in designing products like healthful yogurt or frozen dinner with health-conferring properties.1

The largest chocolate company, Mars, has announced that they will discontinue king size Snickers and Twix bars, and will limit bars to 250 calories by 2013.15 With 2006 sales of $10.4 billion,3 Mars Inc. clearly has the most at stake to lead the emerging dynamics in a calorie-controlled health-conferring chocolate era.

The fatty part in chocolate is cocoa butter, and this contributes significant calories besides what comes from the sugar content of chocolate. Aarhus of Denmark is a leader in cocoa butter substitutes that are natural too.16 Worldwide, palm nuts are used to make cocoa butter substitutes. However, there is a barrier to adoption of cocoa butter substitutes in the United States, as the United States Congress does not allow anything containing over 10 per cent “cocoa butter equivalent” to be called chocolate.17 Could there be a political angle to this injunction?

One sees rumblings of a political twist to the scientific antioxidant story, which could well be used to capture the market. Hershey’s, the large U.S. manufacturer, says the processed cocoa used by some of the well-known European brands like Lindt and Droste contains less than 50 per cent of the antioxidant activity as compared to natural cocoa used by them and other brands like Nestle and Ghirardelli.18 The cocoa used by some of the European manufacturers is “alkalized” by a Dutch process to remove its acidity, turn it to a darker shade of reddish brown that improves its appealing look, to mellow the flavor of the beans, and improve its solubility. Natural cocoa possibly does not taste just as good. Dr Barry Swanson of the Institute of Food Technologists confirms that alkalizing, while improving taste and feel, does drastically reduce antioxidant activity.18
Cocoa beans are harvested largely in third world countries such as the Ivory Coast and Ghana. Abject poverty prevails here. Abusive child labor is exploited to harvest cocoa beans. The socioeconomic conditions in these countries differ to an unimaginable extent from the conditions prevailing in the first world where most of the chocolate is consumed. As the potential for growth in chocolate consumption rises to capture health benefits, there is a danger that the existing exploitation of child health for harvesting cocoa beans in these countries could worsen. This potentially worsening tragedy of mammoth proportions must be averted at all costs. The cocoa industry-wide Harkin-Engel Protocol signed in 2001 was to have ended exploitation by 2005. It was extended to 2008, and then to 2010. Not too long ago, in 2011, Hershey’s and Nestle were identified as using cocoa from Ivory Coast farms that may be using child labor. But now, several companies – Nestle, Kraft-Cadbury, Hershey, Mars, Chocosuisse, Ferrero included – are continually working with authorities in these countries, international agencies and non-governmental organizations to abolish abusive child labor. The industry worldwide has a united front in this mission. Hershey has recently announced plans to offer certified chocolate.

Presumably, all the major chocolate companies are strategizing for every eventuality that may follow what seems like a steady, emerging stream of scientific evidence in favor of health benefits from cocoa products. But barring a few disclosures that have appeared, there have been minimal announcements; most of the planning is secured behind corporate firewalls.

**Suggestion for the Future**

Two approaches that differ in their geographic and socioeconomic spheres of initial application are suggested here. The objective of these approaches is to capitalize and extend the scientifically-derived health benefits of chocolate for the peoples of the world.

Firstly, the cocoa-producing world. Even though the Cambridge study published in the BMJ covered only Europe and America, the health benefits attributed to the antioxidant principles in cocoa might just be true of African, South American, and Southeast Asian populations also. Cocoa is grown in these locations, and the major chocolate companies are already working responsibly with local authorities, NGO’s and international agencies in these countries to preserve child health by abolishing abusive labor practices. They possess the resources to conduct clinical studies in these countries, and are already present there on the ground either directly or through proxies. If they were to feed chocolate to cocoa workers in a controlled manner, they would be in a position to establish whether or not chocolate confers health benefits to these populations. As the process of clinical investigation takes shape in the field, monitoring and corrective health measures of cocoa farm workers would surely result in improvement of the general health of these undernourished, impoverished cocoa workers. Their nutritional status would be greatly uplifted by the consumption of chocolate. Possibly, many of these people now do not even know what the finished product of their labor looks like, leave aside how it tastes. Considering their status of under-nutrition, consumption of chocolate in a clinical trial setting is unlikely to result in the deleterious effects of weight gain; however, all the medical parameters of these clinical trial subjects would need to be monitored as per international ethical clinical trial ICH guidelines. Chocolate companies would then be serving those who have provided the companies with their hardest labor practically for free; they would earn not only goodwill and political mileage, but also invaluable data for their business. In the process, it is scientifically probable that by administering chocolate they will be equipping some
of the poorest people in the world with prophylactic power to prevent cardiovascular and metabolic disorders.

The second approach targets improving chocolate to maximize its antioxidant-derived benefits, while minimizing its less desirable characteristics. If the sugar, fat and calorie content of commercial chocolate preparations were to be somehow reduced by innovative process technology, without altering but preferably fortifying the polyphenol content and yet retaining appealing characteristics of taste and feel, the intrinsic health benefits could be made available to wider sections of society. People who need to watch their intake of sugar, fat and calories would be able to consume much more chocolate than they are presently advised to. Dietary limitations are no longer confined to the western world; a burst of new-found affluence and changing lifestyles in countries like India and China has welcomed metabolic disorders in much of the developing world, barring parts of Africa. Could there be anything much better than a food with the wide acceptability of chocolate, if it could be developed as a vehicle to reduce and prevent the incidence of cardiovascular and metabolic complications that are a scourge of our times? Of course, this is easier said than done, but that is true of almost every major path-breaking initiative. This study has convinced me that chocolate has real promise; but it will remain a promise that will need working on for quite some time. There is adequate common good for all stakeholders in the new potential that chocolate offers, that can diffuse political alignments and narrow self-interests that sometimes work at cross-purposes for everybody. Low calorie, low fat chocolate should be made available to all peoples of the world, regardless of political divide.

Even if and when a causative link with health benefits were to be established, chocolate can be expected to retain some of its defining restrictions. While the people for whom chocolate is off-limits will probably have to live with that injunction, a lot more could potentially avail of its antioxidant benefits by consuming chocolate in small-to-moderate quantities. Even in a best case scenario of reduced-fat, lower calorie avatars becoming available, a little chocolate will be delightful, a lot will not.

References