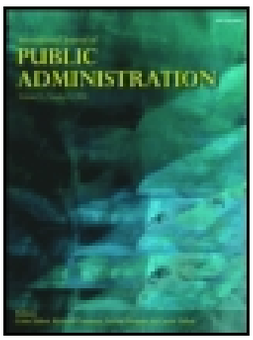

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Institutional design for credence goods: Can the existence of financial incentive be problematic? Evidences from childbirth system of Bangladesh

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ABSTRACT

The introduction of an incentive system in order to increase the provision of credence goods such as health services can be problematic. This article identifies the possible magnitude of over-treatment by physicians in private clinics compared with the situation in government and nongovernment health facilities in Bangladesh. The five to ten times higher volume of cesarean childbirths in private clinics (higher incentive institutions) compared with the volume in government/NGOs health facilities (lower incentive institutions) is indicative of the problem of over-treatment. This problem may become acute where there is only one private clinic in an area; however, the mere increase in the number of private clinics may not solve the problem.

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childbirth system; credence goods; developing country; incentive based system; trust

Introduction

After the rise of neoliberal philosophy, many countries are trying to implement principles of New Public Management (NPM) in the public sector apparatus (Lincoln, 2006). Most of these reform efforts aim to increase effectiveness and efficiency in order to enhance responsiveness to clients and customers, to reduce expenditures and improve managerial accountability (Christensen & Lægreid, 2011). One of NPM's key mechanisms for inducing officials to increase productivity is to implement an incentive system (Dunleavy, Margetts, Bastow, & Tinkler, 2006). In this way, public organizations borrow a practice from the private sector and focus on output rather than input. As such, the boundary between public and private sectors becomes diffuse (Lægreid, 2014). However, the introduction of an incentive system can be a big challenge, especially when trying to devise the right kind of incentive in order to achieve a better outcome. This is more problematic if the services that are provided are credence goods. Credence goods are goods and services about which an expert knows more as regards quality and quantity than do consumers themselves (Dulleck & Kerschbamer, 2006). Due to unfamiliarity with the intricacies and peculiarities of the goods in question, consumers may not be in a position to make good decisions about what they actually need (Emons, 1997), and even after consumption of the service, they may not be in a position to judge whether a suggested quality was actually provided (Dulleck & Kerschbamer, 2006; McCluskey, 2000). Expert services from physicians, lawyers, and auto mechanics are good examples of credence goods (McCluskey, 2000). To understand the requirements for these kinds of services, consumers must trust experts. Credence goods therefore create information asymmetry (when one party has more or better information than others) between service providers and recipients. In such a situation, the introduction of an incentive system for service providers may be problematic, as it may encourage service providers to act in opportunistic ways for the sake of personal gain. Opportunistic behavior may become more prevalent where there is problematic governance and comparatively loose regulation. In this type of situation, an opportunistic expert can exploit the information asymmetry for personal gain.

In general, many developing countries have various governance-related challenges and regulatory limitations. A good example is Bangladesh: in 2015 it was ranked 172nd out of 175 countries in the corruption perception index (CPI) by Transparency International (TI) (TIB, 2015). This means the country is greatly affected by the problem of corruption. In a country like Bangladesh, therefore, there are more possibilities to exploit information asymmetry than in countries with less corruption. This article explores possible opportunistic behavior in the childbirth system of

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Bangladesh. When a baby is about to be born, physicians may choose a cesarean delivery merely due to financial incentives, regardless of whether a normal delivery would be possible (Grant, 2009). To understand such cases, the study divides the childbirth system of Bangladesh into two broad categories that are based on the degree of direct financial gain received by physicians on account of the treatments they provide: *lower incentive institutions* (e.g., health facilities run by the government and nongovernmental organizations, NGOs) and *higher incentive institutions* such as private clinics. In lower incentive institutions, physicians generally receive their regular monthly salaries and do not get an extra allowance or financial benefits for providing health services. In higher incentive institutions, physicians' earnings are dependent on the services provided. This article therefore hypothesizes that in higher incentive institutions, physicians may have an extra motivation for *overtreatment* – for instance, to do cesarean deliveries without proper medical grounds, rather than delivering babies in the normal way – as compared with the practice in lower incentive institutions. The study finds that higher incentive institutions have five to ten times higher incidents of cesarean delivery than do the lower incentive institutions. This could indicate a problem of overtreatment. The finding suggests that the introduction of competition in service delivery may not reduce the problem of credence goods, since the mere increase in competition does not necessarily lead to a corresponding decrease in the problem of overtreatment. However, the existence of one private clinic, which creates a situation of absolute monopoly, is worse than a situation where many private clinics provide services on a competitive basis. According to this study, in places where there is an absolute monopoly, the incidence of 100% cesarean delivery is higher compared with places where there is competition (exception: two places out of 171 places). The existence of alternative types of service providers (such as NGOs, which have more philanthropic and altruistic values), however, may help reduce the problem of overtreatment in the private clinics. Here, free or lower cost of health services from NGOs may contribute. Due to the lower search cost at the NGO health facilities, the net gain may be higher than having a cesarean delivery, which may motivate one to go for the search option. This may indicate that just the availability of service provider may not be sufficient, their nature may also be important.

The study does not find any statistically significant effects of government health facilities on child delivery cases. It is not clear why government health facilities do not have any statistically significant effect. The present study mainly identifies the trends of government and NGO health facilities, but it does not investigate these dynamics in order to discover the possible causal mechanisms. One possible explanation, however, could be that government health facilities' poor reputation and lack of infrastructure may discourage people from seeking health-care service in these institutions. Yet, this proposed explanation needs further investigation to prove.

Conceptual clarification and earlier studies

Credence goods can be characterized by asymmetric information between sellers and consumers, which may give rise to inefficiencies such as under- or overtreatment, market breakdown (Dulleck, Kerschbamer, & Sutter, 2011), and overcharging (Balafoutas, Beck, Kerschbamer, & Sutter, 2013). Credence goods can also be divided into two types based on whether *ex ante* ('before the event') information can or cannot be provided (like labeling of food products) (Roe & Sheldon, 2007). The presence of regulatory agencies (e.g., the U.S. Food and Drug Administration) and their degree of trustworthiness may reduce the problem of credence goods (Lassoued, Hobbs, Micheels, & Zhang, 2015; Roe & Sheldon, 2007). Labeling also provides opportunities for *ex post* examination by an expert and may help reduce fraudulent practice. However, this is not possible for credence goods such as medical treatments. This may encourage some health-care providers to exploit their information advantage over 'health service seekers'. Since health service seekers are usually the only source of income for private clinics, these clinics may exploit information asymmetry. The source of financing is therefore important in the health sector (Bali & Ramesh, 2015), as it may affect the decision to overtreat health service seekers.

In the health sector, one of the main fraudulent behaviors is the creation of 'induced demand' (Gruber and Owings, 1996). This is a situation where a demand is created by an expert who, based on his expertise, exploits someone by determining the nature of the service in a situation of ambiguity. Balafoutas et al. (2013) label this problem as a 'second-degree moral hazard'. To indicate the problem, they cite an article from the German weekly magazine *Der Spigel* (December 23, 2012), which tells about faked and inflated medical bills amounting to around 6–24 billion euros. Other scholars mention the same problem in other countries. Emons (2001), for instance, relates that in Switzerland, patients with a minimum level of schooling are twice as likely to have their womb or

gall-stones removed than are patients with a university degree; and for hip-joint operations, the probability will increase by 150%. Gruber and Owings (1996) found that in the USA, a 13.5% fall in fertility over the period 1970–1982 led to a costlier form of childbirth: cesarean delivery. Given that the problems related to credence goods occur in better-regulated countries like Germany, Switzerland, and the USA, it is likely that they are even more prevalent in a developing country like Bangladesh, where governance is problematic and regulations are more difficult to enforce.

For the health sector, the problem of induced demand has two key dimensions: overtreatment and overcharging (Dulleck & Kerschbamer, 2006). Overtreatment refers to a treatment that is given even though it is unnecessary, and overcharging simply means to charge too much for a service (Balafoutas et al., 2013). Both phenomena may occur due to financial incentives, especially in contexts that lack regulations and professional ethics. In the case of induced demand, a physician makes some kind of deliberate attempt to increase the demand for a service, whereas overtreatment can also sometime arise due to a physician's non-intentional inefficiency. Cesarean delivery may be considered overtreatment if it is not based on medical grounds. Overtreatment has two problematic dimensions: physiological and financial. Physiologically, it can affect the maternal mortality rate or lead to a mother suffering from a less-severe but more common problem such as a postoperative infection or hemorrhage. Infants may suffer from respiratory distress syndrome if delivered prematurely (Gruber and Owings, 1996). Occurrences of such problems may be higher in a developing country where medical facilities are limited. Financially, cesarean delivery is more costly than vaginal birth (normal delivery) because it requires more medical aids to deliver the child. Cesarean delivery may not always be a case of induced demand – some patients may have a spontaneous need for it – it is the sort of operation that can be scheduled in advance and may need less time than a normal childbirth with extended labor (Gruber and Owings, 1996). Furthermore, the moral hazard connected to cesarean birth can also be caused by patients. Some patients may demand a cesarean delivery simply because they have insurance and need only to pay a small fraction of the actual cost (Sülzle & Wambach, 2005). This study will not focus on this aspect of the moral hazard, however, because it does not apply to the case of Bangladesh, a country where most patients pay their own bills and have no health insurance. This study will also not cover the problem of overcharging, as it is difficult to detect and measure.

Hypotheses development

In the health sector, overtreatment indicates that physicians exploit their relationship with patients. Two assumptions underlie this proposition (De Jaegher & Jegers, 2001): first, due to information asymmetry, it is difficult for a service recipient to assess whether or not a physician is giving proper treatment, as the outcome (the treatment result) may not be a good indicator to assess the quality of the treatment. A physician may try his or her level best to provide satisfactory service but still be unsuccessful. For example, the *ex post* result of a toothache may not be a good indicator that a dentist did not provide necessary treatment during the last dental checkup (Emons, 1997). Even the repeated consumption of these types of services may be insufficient for a consumer (patient) to understand his or her medical needs (Smith & Royne, 2010). The patient must therefore simply trust the opinion of the physician. Trust therefore becomes an important factor when the customer is not in a position to judge the need for and quality of services (Hsieh, Chiu, & Chiang, 2005). Second, under such ambiguous conditions, service providers may have a financial motivation to capitalize on the situation. A financial incentive may become important in the relationship between physicians and patients. To elucidate the possible effects of financial incentive on the problem of overtreatment, Figure 1 presents a 2 × 2 matrix.

Examining Figure 1, it appears that in Q1, a higher financial incentive may lead to a higher level of overtreatment, because an expert can benefit financially from that overtreatment. A financial incentive would thus become an important factor in determining the nature of a treatment, rather than basing the treatment on a proper medical diagnosis. The opposite scenario is reflected in Q3: due to a lower financial incentive, an expert may choose not to overtreat a patient. In Q2, despite lower incentive, the problem of overtreatment

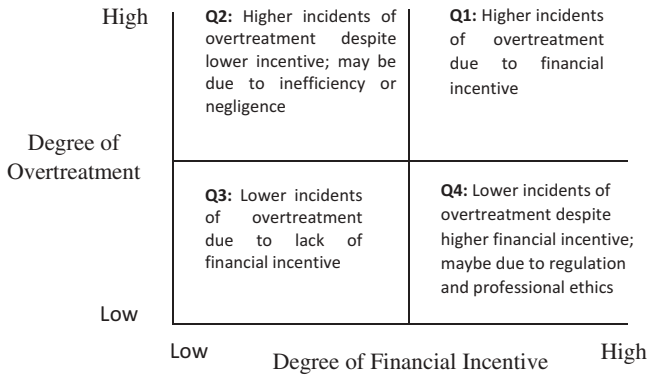

Figure 1. Determining the possible dynamics between financial incentives and overtreatment in the health sector.

may arise due to a physician's inadequate knowledge, no proper diagnosis, or sheer negligence. In Q4, the financial incentive is high, but a higher level of regulation and professional ethics may restrict the physician from behaving opportunistically.

Certain empirical studies show the effect of financial incentives. Stafford (1990) sampled data from various hospitals in California and showed that cesarean rates were the highest for mothers with private insurance, followed by those with public insurance. The smallest number of cesarean births was had by uninsured mothers. This evidence from the USA indicates that even in a relatively highly regulated country, credence goods may be problematic if there is an opportunity for service providers to benefit financially. Thus, the possibility to regulate (both institutional regulation and self-regulation) may be difficult for the credence goods as described at Q4. In accordance with the theoretical arguments and empirical evidence presented thus far, a relevant two-part hypothesis for this study can be formulated as follows:

H1(a): The degree of financial incentive for physicians may contribute to determining the nature of treatment.

H1(b): Giving providers of credence goods a financial incentive can be problematic.

In this study, the proposed hypothesis is tested using data from childbirth services in Bangladesh, a country that provides the necessary conditions for testing H1 because it has different types of child delivery, and the choice of one method over another may be influenced by the incentive structure. Cesarean delivery is usually more costly than normal childbirth – this is the case almost everywhere in the world (Gruber and Owings, 1996) – and physicians may opt for it merely because it gives them financial gain, even when a child could have been born in the normal way.

To curb fraudulent behavior in connection with the provision of credence goods, there are, apart from ethical protocols and regulations, other measures such as labeling/traceability (Hobbs, 2004; Roe & Sheldon, 2007), the separation of diagnosis and treatment (Emons, 1997), and the reduction of monopolies (Dulleck et al., 2011). Labeling is not applicable to medical treatments so it is not examined in this study. The practice of separating diagnosis from treatment – that is, of having one institution do the diagnosis and another do the treatment – may be a possible solution, but it seems unattractive because sometimes providing both together can be cheaper (Emons, 1997). Particularly in developing countries, going for an expensive option instead of a cheaper one may be challenging due to resource scarcity, the lack of skilled manpower, and inefficiency. The last option, to reduce monopolies, may be a means to address the challenge associated with asymmetric information. In a monopolistic situation, consumers lack other options from which to choose. When they are given options, two things may happen: first, they may compare and verify information and choose among health service providers, thus reducing the vulnerability caused by information asymmetry; second, experts may come to see their fraudulent behavior as a liability, since they risk losing their reputation and eventually the customers. Fear of such risks may inhibit opportunistic behavior (Emons, 2001). Wolinsky's (1993) study supports this view, but he indicates that the process of verifying information may add extra cost to the consumers due to searching information. His study examines how customers' search for multiple opinions and their analysis of experts' reputations function so as to discipline experts. Marty (1999) finds that the presence of honest experts can reduce the fraudulent behavior of selfish experts. In a monopolistic situation, an opportunistic expert may be motivated to provide under-treatment as well, so that the patient returns in the future. An example would be when a dentist fixes teeth in a way that requires additional appointments. Such a trend is found by Andersen (2009), who notes a difference between government-funded dentistry in Denmark, where the choice of treatment is entirely unrelated to remuneration, and the practice of privately funded dentistry; the privately funded dentists use less 'fissure sealing' (dental treatment to prevent tooth decay) than do public dentists. In line with these arguments, the study postulates the following:

H2: Reducing monopolies for the provision of credence goods may reduce the opportunistic behavior of experts.

Empirical framework and research methodology

To test the first proposition (H1), the study identifies two types of institutions: one with a higher level of financial incentive and the other with lower financial incentive. This helps capture variations in the explanatory variable, namely, the degree of financial incentive and its possible effect on the dependent variable, that is, the nature of treatment. For this study, the lower incentive-based institutions are defined as those health facilities where the earnings of physicians are not generally dependent on the services the physicians provide; in the higher

incentive-based institutions, earnings are indeed dependent on the services that are provided. Physicians from the higher incentive-based institutions may therefore choose more overtreatment than do the lower incentive-based institutions. Using this definition, the childbirth service-providing institutions of Bangladesh are divided into two broad categories: lower incentive institutions, which include government/public health facilities and NGOs, and higher incentive institutions, which consist of private clinics. In government health facilities, physicians do not receive any extra financial benefits for delivering babies. They receive regular salaries. They therefore have less incentive to choose overtreatment or unnecessarily expensive options like cesarean delivery (Table 1). For this study, the primary units of analysis are *Upazila* (subdistrict) Health Complexes (UHCs). These are spread throughout the country and are public institutions that provide health services at the local level. Other government institutions like Union Health and Family Welfare Centers (UHFWCs) and Union Sub Centers (USCs) are also considered, but are less widespread and therefore less significant.

The aforementioned logic associated with the incentives structure for government health institutions is also applicable for physicians from NGOs; the NGO physicians mainly receive regular monthly salaries, and in many cases, the NGOs do not even have physicians. As such, nurses or midwives run the child delivery system. In general, those who receive services from government health institutions and NGOs are relatively poor; many find it difficult to pay for treatment. This may be another reason why these institutions try to avoid more costly childbirth option. On the other hand, physicians from private clinics have higher motivation to go for 'overtreatment' or 'overcharging' because their main earnings come from patients. Furthermore, the physicians themselves are in many cases owners or shareholders of the enterprise, which is run on a commercial basis. There is therefore a stronger motivation for choosing more costly treatments. This study uses this variation in financial incentive between these two types of institutions to explore the possible effects of such variation on the childbirth system in Bangladesh. For this, the study uses data published in 2015 by the Directorate General of Health Services (DGHS), Government of Bangladesh (available at http://www.dghs.gov.bd/). The data comes from 424 *Upazilas* (subdistricts) (out of 476). In terms of population, these 424 subdistricts have around 115 million people. The country's total population is approximately 159 million (Bangladesh Bureau of Statistics, 2016). The available data is therefore quite comprehensive and covers the majority of the population. For the second hypothesis (H2), the study uses the volume of cesarean deliveries (in percentage, compared with the total number of deliveries) of the private clinics at the subdistrict level, in order to measure the dependent variable (degree of opportunistic behavior). The independent variable is the degree of competition amongst service providers at the subdistrict level. If there is only one private clinic in a subdistrict, it is considered an absolute monopoly, and more than one private clinic is likely to increase competitiveness. The study also considers the presence of other types of service providers (measured through the number and capacity of the service providers) such as governmental and NGOs health facilities, as these may also influence the dependent variable.

Table 1. Types of selected health institutions in Bangladesh and their rationales.

Types of Institutions	Institutions	Rationales
Lower incentive-based institutions	Government and NGO health facilities	Physicians' earnings are not dependent on the volume of services provided; they mainly receive a monthly salary.
Higher incentive-based institutions	Private clinics	Generally, physicians' earnings are dependent on the volume of services provided; even the survival of the clinics is dependent on earnings from the provided treatments.

In addition, the study includes data from an online survey that was conducted to complement the findings from the registry data of DGHS. A total of 44 women of Bangladeshi origin who already have children were selected. Such selection is based on convenience and accessibility. At first, the online survey link was sent to a few people who were known to the researcher with a request to respond and they were also asked to forward the link to others who fulfilled the criterion of already having children. Thus, a snowball technique was used to contact most of the respondents, and the researcher had no control over their selection. From this perspective, the data can be treated as random but at the same time biased toward middle-class educated people who have Internet access. This may reduce the external validity of the data, but it is useful to check whether it matches with the findings of the registered data. The survey data is also helpful to derive an indication of the patterns of child delivery and associated cost; it helps researchers understand mothers' preferences with regard to natural or cesarean delivery.

Findings and discussions

Health facilities and the childbirth system in Bangladesh

From Table 2, it appears that a good number of children (279,584) are born in the private clinics. This is 12% of the newly born children in the sample areas.

Table 2. Childbirth in different health facilities in Bangladesh.

Nature of Health Facility	Total Number of Newly Born Babies	(%)
NGO health facilities	118,012	5
Other government health facilities (UHFWC, USC, and others)	161,669	7
Private clinics	279,584	12
Upazila (subdistrict) Health Complex (UHC) (government)	280,033	12
Other (mostly not in any facility)	1,508,282	64

Source: Based on data from the Directorate General of Health Services (DGHS), Government of Bangladesh, 2015.

Around the same number (12%) of babies are born in government-run health facilities (UHC) at the subdistrict level. Other government facilities (UHFWC, USC, and others) account for around 7%. The contribution of NGOs is around half (i.e., 5%) of the UHC and private clinics. Most babies (around 64%) are born at home and sometimes receive support from midwives. Thus, it appears that the number of childbirths in private clinics is significant (almost equal to that of UHC health facilities), particularly regarding births in institutions.

The online survey was useful for finding out the cost associated with childbirth in different health facilities. In the case of cesarean operations, the average cost in government health facilities is BDT 5,000–6,000 (USD 62–75), and the cost for normal delivery is BDT 2,000 (USD 25). The daily expense for a hospital bed is around BDT 275 (USD 3.5). In the case of NGOs providing similar services, the cost varies from BDT 1,000 to 5,000 (USD 12–62) for normal delivery, and for cesarean delivery, it can be around BDT 10,000 (USD 125). On the other hand, the cost in private clinics may vary substantially depending on the availability of facilities, their location, and other factors. The average cost for a normal delivery is around BDT 10,000 (USD 125), and a cesarean delivery is around BDT 40,000–50,000 (USD 500–625). This is a rough scenario for the private clinics; however, the prices vary a lot in the large cities. In fact, the total cost can be around BDT 100,000–150,000 (USD 1,250–1,875) in the large cities. Apart from these huge variations, it can be roughly calculated that when compared with normal delivery in private clinics, the cost of a cesarean delivery is around four to five times higher. If there are no complications during a normal delivery, the average required stay at a health facility is one day, while the required stay for cesarean delivery is three days. Of course, the length of stay may increase if there are complications. In the case where patients stay more than the required number of days, private clinics may be benefited from that overstaying. Due to these higher financial incentives, there can be a strong motivation for the physicians of private clinics to go for cesarean delivery instead of normal delivery.

Nature of childbirth and test of hypotheses

From Table 3, it appears that the volume of childbirth is more or less the same for the UHC and private clinics (280,033 and 279,584, respectively), but that the mean value for cesarean delivery at private clinics is much higher (383.46) than at the UHC facilities (68.44). For the other types of institutions – NGOs and other types of government health facilities – the mean values are also lower. However, the total number of childbirths at NGO facilities is 118,012, whereas at the private clinics, it is 279,584 (Table 2).

To gain a clearer understanding of the differences outlined above, along with the statistical significance of the childbirth-related trends, the study performed an Analysis of Variance (ANOVA) test (for details on significance tests, see Appendix A). Since the sample size is not equal across all categories of data (the variation in 'n' values in Table 4 varies among government facilities, NGO facilities, and private clinics), the study uses Hochberg's GT2 procedure instead of the most widely used Tukey's range test (Field, 2013). To determine this mean, the study uses the percentage of cesarean deliveries compared with the total number of child deliveries carried out by the respective health service providers. Table 4 indicates that the mean for cesarean delivery at private clinics is much higher (M = 65.10, SD = 29.79) than at the UHC facilities (M = 6.18,

Table 3. Different types of childbirth in different health service providers of Bangladesh.

Nature of Service Delivery Organization	Normal Delivery			Cesarean Delivery			Forceps Delivery			
	Number	Minimum – Maximum	Mean	Number	Minimum-Maximum	Mean	Number	Minimum-Maximum	Mean	Total
UHC (Government)	250,332	0 – 12,100	587.32	29,018	0 – 5,460	**68.44**	683	0 – 194	1.61	280,033
Other Government	143,893	0 – 12,069	339.37	17,758	0 – 2,834	**41.88**	18	0 – 9	.04	161,669
NGOs	104,243	0 – 5,185	244.79	13,568	0 – 1,381	**32.00**	201	0 – 116	.47	118,012
Private Clinics	116,661	0 – 10,326	270.53	162,589	0 – 10,341	**383.46**	334	0 – 155	.79	279,584
Other	1,489,598	0 – 18,150	3513.20	18,160	0 – 1,713	**42.83**	524	0 – 1713	42.83	1,508,282
Total	2,104,727			241,093			1,760			2,347,580

Source: Based on data from the Directorate General of Health Services (DGHS), Government of Bangladesh, 2015

Table 4. The *post hoc* results for cesarean delivery at different health facilities.

Types of Health Facilities	N	Mean	Std. Deviation	Mean Differences 1	2	3	4
1. Private clinics	245	65.10	29.79	–			
2. UHC (govt.)	409	6.18	14.17	58.93*	–	–	
3. Other government health facilities	206	13.56	28.30	51.55*	−7.38*	–	
4. NGOS	115	13.38	22.51	51.73**	−7.20**	.18	–
5. Total	975	23.39	33.59				

*$p < .01$ and **$p < .05$.

SD = 14.17), at other government facilities (UHFWC, USC, and others) (*M* = 13.56, *SD* = 28.30), and at NGOs (*M* = 13.38, *SD* = 22.51). It therefore appears that cesarean delivery at private clinics is around 5–10 times higher than at government facilities and NGOs. This significant difference may indicate that the private clinics have a tendency toward overtreatment. Table 4 also indicates that the mean differences among the various health facilities are statistically significant as $p < .05$. For cesarean delivery, the mean difference between private clinics and UHC facilities is 58.93 ($p < .01$); for other government facilities, it is 51.55 ($p < .01$) and for NGOs, it is 51.73 ($p < .05$).

These results correspond to the expectation in Hypothesis 1a, since the private clinics have more financial incentive than do the other types of institutions covered in this study, and since the magnitude of cesarean delivery in the private clinics is much higher (Table 4). The findings of the current study therefore support Hypothesis 1a. The findings also indicate that the introduction of market principles in service provider organizations, in particular, financial incentives for the delivery of credence goods, can be problematic (Hypothesis 1b). Nevertheless, from the current study, it is impossible to determine the percentage of cesarean deliveries that were really necessary for medical reasons, which percentage was based on patients' preferences, and which percentage was due to overtreatment. The statistics of the study do however clearly indicate that the private clinics have a preference for cesarean delivery. In terms of monetary gain, the cumulative cost of cesarean delivery in private clinics is very high, with the total expenditure somewhere around USD 81–100 million (assuming that each cesarean operation costs around USD 500–625). In cases where overtreatment is a fact, it adds an extra burden on the patients, not only financially, but also in terms of physical and psychological stress.

From the small non-representative online survey, we gain an idea of patients' preferences. It shows that 90% of the respondents had a cesarean delivery in a private health facility (Table 5). While 28% of the respondents themselves chose to have a cesarean delivery, 72% were advised by the physicians to do so. It is impossible to confirm how many of this 72% really needed a cesarean operation for medical reasons, but the higher cesarean delivery rate in private health facilities may still be indicative of the problem of overtreatment. These statistics also add force to Hypothesis 1a and indicate that most of the cesarean deliveries may be due to overtreatment. Thus, this finding complements the previous finding from the registered data.

We also gain an indication of the possible problem of overtreatment from Table 6; the linear regression models indicate that the number of 'complicated case of pregnancy' at the private clinics has significant positive effects on the number of cesarean deliveries, as $\beta = .170$ and $p < .05$ (Regression model 1) and $\beta = .134$, and $p < .10$ (Regression model 2) in the respective models. A 'complicated case of pregnancy' may indicate a need for cesarean delivery, but the smaller adjusted R^2 values (adjusted $R^2 = .050$ for both models) may indicate that the explanatory variables of the models only pertain to a small amount of variation in the dependent variable (percentage of cesarean delivery at various private clinics).

Table 6 shows that the *number* of women who make their first antenatal care (ANC) visit to an NGO also has statistically significant effects on the number of cesarean deliveries in the private clinics (see Antenatal care: first visit to NGO; $\beta = -.251$ and $p < .10$ (Regression model 1) and

Table 5. Respondents' chosen child delivery system in different types of institutions and rationales for choosing cesarean delivery (figures in the parentheses are percentages).

Criteria of Health Facilities	Method of Child Delivery	Number of Respondents	Own Decision for Cesarean Delivery	Physicians' Advice for Cesarean Delivery
Public Health Facilities	Normal Delivery	0	–	–
	Cesarean delivery	4 (100)	0	4 (100)
	Total	4 (100)		
Private Health Facilities	Normal Delivery	4 (10)	–	–
	Cesarean delivery	35 (90)	7 (28)	28 (72)
	Total	39(100)		
NGO Health Facilities	Normal Delivery	1 (100)	–	–
	Cesarean delivery	0	0	0
	Total	1 (100)		
	Grand Total	44		

Source: Online Survey on Female of Bangladesh, 2016.

Table 6. Summary of the linear regression models on cesarean child delivery at different private clinics in Bangladesh (Standardized Beta Coefficients) (N = 245).

	Model 1	Model 2
Number of health facilities		
Government	−.060	−.064
NGO	−.108	−.102
Private clinics	.017	.027
Capacities of the health facilities		
Government	.069	.065
NGO	−.015	−.102
Private clinics	.041	.067
Antenatal care: First visit		
Government	.071	.078
NGO	−.251***	−.242***
Private clinics	−.019	−.037
Antenatal care: Fourth visit		
Government	−.025	−.035
NGO	.124	.115
Private clinics	−.167	−.167
Complicated case of pregnancy at private clinics	.170**	.134***
Interaction effects		
Capacity of health facilities		
Govt. × Private clinics		.241
NGO × Private clinics		−1.09
Constant	63.013	62.575
Adjusted R^2	.050	.050
F	1.982**	1.847**

*$p < .01$, **$p < .05$, ***$p < .10$.

Note: Dependent variable is the percentage of cesarean delivery at various private clinics in Bangladesh (at the subdistrict level)

Source: Based on data from Directorate General of Health Services (DGHS), Government of Bangladesh, 2015.

$\beta = -.242$ and $p < .10$ (Regression model 2)). This negative effect of NGOs on cesarean deliveries in private clinics may be explained by the availability of alternative service providers. This possible effect of NGOs may indicate that some of the pregnant women went to NGOs to verify the nature of the treatment they needed, and that this information could have helped them when they visited a private clinic. Through checkups conducted by NGOs, patients may gain insight on whether or not they need a cesarean delivery. However, the fourth antenatal-care visit does not show any statistically significant trend. From Table 6, it also appears that there is no statistically significant effect (due to the higher '*p*' values) of the number or the capacity of the government health facilities on the percentage of cesarean deliveries in private clinics. Similarly, the study does not find any effect from interaction between the health facilities.

The second hypothesis of this study is about testing market mechanisms to control fraudulent behavior. Table 6 indicates that having a higher number of private clinics at the subdistrict level does not reduce the amount of cesarean deliveries, as $\beta = .017$ and $p > .10$ (Model 1) and $\beta = .027$ and $p > .10$ (Model 2). From this, it seems that the second proposition (H2) of the study is not supported by the study findings. Table 7, however, may provide more insight. Among the sample subdistricts in this study, there are 203 locations where there are private clinics. Among these, 32 locations have only one private clinic, and of this set, 28.12% have 100% cesarean delivery. This is the highest incidence of 100% cesarean delivery except for number 13, which has 100% incidence, and number 16, which has 33.3% incidence. It appears that in most of the cases, the incidences of cesarean delivery decrease hand-in-hand with an increase in the number of clinics, but that the decrease is inconsistent. Some subdistricts have a higher rate of incidences of cesarean delivery (for example, in the subdistrict that has 16 private clinics). This trend is graphically explained in the boxplot and in the trend graph (Figure 2).

From the boxplot (Figure 2a), it appears that when the number of private clinics in subdistricts is 'one', then there are relatively more incidences of 100% cesarean delivery (except for numbers 13 and 16). When the number of private clinics increases from 'one', then the clinic that had 100% cesarean deliveries also experiences a decline in the number of cesarean operations it performs. The trend diagram (Figure 2b) may more clearly indicate the patterns of having 100% cesarean delivery in different subdistricts. This may indicate partial support for the second Hypothesis (H2). The study cannot fully support the proposition, since the increase in competition (measured by the increase in the number of clinics) does not show any clear patterns.

From the boxplot, it also appears that the median is higher for those places where there is only one clinic in a subdistrict (with some exceptions). The beginning of the 3rd quartile is around 80%, where there is only one private clinic; this may indicate that the number of cesarean deliveries is quiet high in those places. After number one, the median drops, but it again increases at four, and later there is no clear pattern. The existence of only one clinic in combination with the higher level of cesarean deliveries may indicate the effect of the monopoly in the area, and the clinic may capitalize on the situation.

From the current data, it may be said that an absolute monopoly may, in most cases, be worse than having competition, due to the higher frequency of 100% cesarean delivery. The study also indicates that the existence of alternative types of service providers may help reduce the problem of overtreatment in the private clinics. Nevertheless, the mere existence of these alternative providers is insufficient for making a clear impact on the level of cesarean births; their nature and institutional design are also important. Here, free or lower-cost health services provided by NGOs may contribute positively; when patients visit NGOs, they have an opportunity to verify the information they receive from private clinics.

Table 7. Variation of incidences of cesarean delivery based on the number of private clinics in a subdistrict (*Upazila*).

No of Clinics in different Subdistricts	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	23	26	48
Number of clinics having 100% cesarean delivery	9 (28.12)	6 (9.68)	15 (14.3)	4 (9.1)	5 (4.8)	12 (25.0)	0 (0)	0 (0)	0 (0)	20 (22.2)	0 (0)	0 (0)	13 (100)	0 (0)	15 (25)	16 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)
Number of clinics having less than 100% cesarean delivery	23 (71.88)	56 (90.32)	90 (85.71)	40 (90.9)	100 (95.2)	36 (75.0)	105 (100)	96 (100)	54 (100)	70 (77.8)	22 (100)	72 (100)	0 (0)	28 (100)	45 (75)	32 (66.7)	17 (100)	46 (100)	26 (100)	48 (100)
Total Clinics	32 (100)	62 (100)	105 (100)	44 (100)	105 (100)	48 (100)	105 (100)	96 (100)	54 (100)	90 (100)	22 (100)	72 (100)	13 (100)	28 (100)	60 (100)	48 (100)	17 (100)	46 (100)	26 (100)	48 (100)
Total Places	32	31	35	11	21	8	15	12	6	9	2	6	1	2	4	3	1	2	1	1

Source: Based on data from Directorate General of Health Services (DGHS), Government of Bangladesh, 2015.

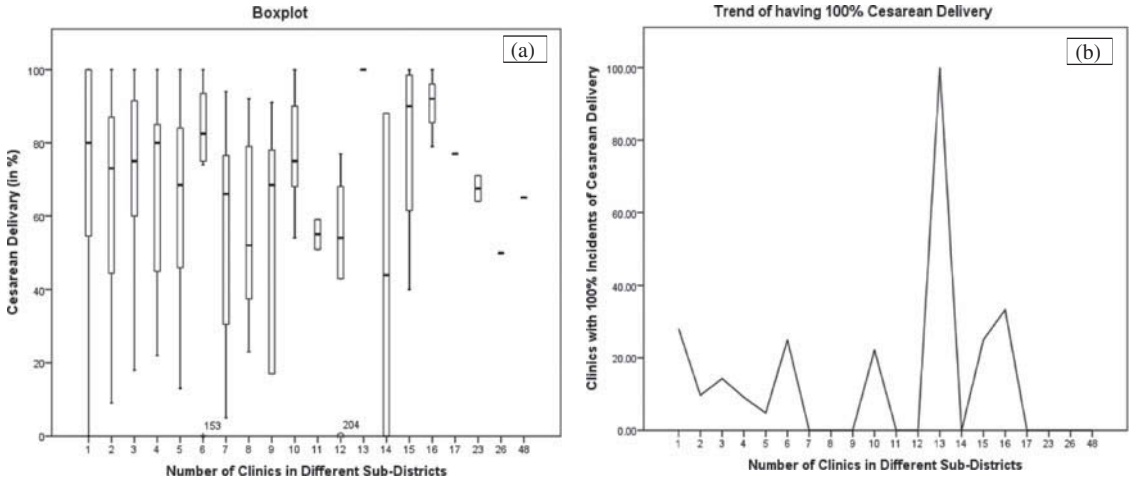

Figure 2. Variation of the volume of cesarean delivery (in %) based on the number of private clinics in different subdistricts of Bangladesh.

This study does not find any statistically significant impact on the private clinics from government health facilities that is comparable to the impact of the NGOs. This is the case even though the government health facilities cost more or less the same as the NGOs. The study identifies this trend but does not try to investigate its possible causal mechanisms. One possible explanation may be that the government health facilities, in addition to having a poor reputation, are only used by the poorest groups in the country.

The trend of NGOs is consistent with Wolinsky's (1993) findings, as he indicates that the scope of verification may help reduce the problems associated with credence goods, but that the search for more information may also add to the cost. However, this happens as the cost of getting an opinion from an NGO is relatively low. In many cases, NGOs' services are free or nominal. This may motivate people to verify the information they receive from private clinics. Thus, the net gain may be higher here than the search cost. The findings of this study that relate to H2 are also consistent with the study of Dulleck et al. (2011), which shows that competition between sellers may drive down prices and yield maximal trade, but may not lead to higher efficiency.

Conclusions

The contribution of this article may be twofold: one is a practical implication and the other is theoretical. The practical implication relates to identifying a problem: physicians who work in private clinics in Bangladesh tend to opt for overtreatment. They mostly recommend cesarean delivery for childbirth, and on many occasions, rather than basing this decision on medical grounds, let themselves be swayed by a financial incentive. The large difference in the number of cesarean deliveries (5–10 times) between the institutions with lower or no monetary incentive (governmental and NGO health facilities) and institutions with higher monetary incentive (private clinics) could be indicative of this problem. The problem of overcharging may also exist, but it is difficult to measure under the current research design and was therefore not covered.

The theoretical implication is that the introduction of a financial incentive system for service providers of credence goods, in order to encourage them to be more productive, may be problematic, especially in developing countries. Since the problem of overtreatment also exists in relatively well-regulated countries, such a provision may have greater detrimental effects in developing countries, where there is a deficit in regulations and rule of law.

However, the findings of the current research may have even broader implications, given that the childbirth system can be indicative for other medical services provided by the private clinics in Bangladesh. They may opt for overtreatment in other areas as well, especially when the risk is low or when operations are less sophisticated. An example could be appendix removal. Such unnecessary operations add to people's financial burdens and may affect their health. Given that Bangladesh is a developing country, the extra cost also has an impact on the national level. Before this type of problem increases further, it needs to be addressed with necessary regulations and effective policy intervention.

While the second finding of the study may also affect policy, it also has theoretical implications. The study found that an absolute monopoly – a situation where only one private clinic exists in a subdistrict – can have a worse

outcome than a situation of competition between several private clinics. This is because in those locations where an absolute monopoly exists, there are more incidents of 100% cesarean delivery. Increasing the number of clinics may not reduce the problem, given that we do not find any statistically significant trend. The existence of alternative types of service providers may have some effect, as the existence of NGOs does show a statistically significant trend. This may be because health service seekers have an opportunity to verify the information they receive from private clinics, thus reducing the problem of information asymmetry. And health service seekers may be interested to do so, as the net gain is higher than the verification cost. However, the study does not find any statistically significant relationship between the practice of private clinics and the existence of government health facilities in subdistricts. From this study, it is not clear why they differ in terms of effects on private clinics; poor facilities and a poor reputation or even variation in service-recipient groups with no ability to pay may be contributing factors here, but the matter needs to be investigated further.

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Appendix A: ANOVA and Other Robustness Test Results

Different Tests	Test Values
Levene's test	56.79*
F value for ANOVA	360.04*
Welch	280.28*
Brown–Forsythe	311.28*

*$p < .01$