

Diffusion of HPV vaccination among physicians in New Delhi, India

**Barriers and drivers towards the intention to recommend HPV vaccination by
paediatricians and gynaecologists**

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Samenvatting

Introductie. Baarmoederhalskanker is de meest voorkomende vorm van kanker onder vrouwen in India. Ieder jaar sterven zo'n 75 000 vrouwen ten gevolge van deze ziekte. De WHO verwacht dat in 2025 zo'n 130 000 vrouwen aan deze ziekte zullen overlijden, als er geen interventie is. Sinds 1,5 jaar is er een interventie beschikbaar in India; HPV vaccinatie. De Indiase gezondheidszorg bestaat uit een publieke en private sector, in beide sectoren moeten vrouwen zelf voor vaccinatie betalen. In India kost dit zo'n 160 euro voor de drie benodigde vaccinaties. Veel vrouwen zijn niet gevaccineerd en veel artsen aarzelen om de vaccinatie aan te bevelen. Dit is een kwalitatief onderzoek dat de drijfveren en obstakels onderzoekt, die er verantwoordelijk voor zijn dat gynaecologen en kinderartsen vaccinatie aanbevelen aan hun patiënten.

Theoretisch kader. Dit onderzoek is gebaseerd op twee theorieën van Everett M. Rogers' boek: 'Diffusion of Innovations'. De twee theorieën hebben betrekking op de snelheid van adoptie en het verspreidingspatroon. Deze kunnen gemeten worden op basis van de items die zijn ontwikkeld voor een interview door Moore & Benbasat. Het interview is aangepast en ingekort passend bij het onderwerp van HPV vaccinatie en meet de volgende constructen: compatibiliteit, complexiteit, imago en relatief voordeel. Verder is er aan de artsen gevraagd wat zij denken dat het probleem is omtrent deze vaccinatie.

Methoden. Het onderzoek is gehouden onder leiding van MSD India. Het ging om informed consent interviews gehouden met gynaecologen en kinderartsen in de publieke en private sector, zowel adopters als non adopters van HPV vaccinatie. Voor deze groepen is gekozen naar aanleiding van de zorgsysteem in India en op welke disciplines de focus van MSD India ligt betreffende HPV vaccinatie. De samplegrootte is gekozen op basis van haalbaarheid, het was noodzakelijk gedurende 5 weken mee te gaan met de sales representatives van MSD India. De interviews hebben plaatsgevonden in New Delhi, ze bestonden uit gesloten en open vragen.

Resultaten. Er zijn in totaal 53 artsen geïnterviewd, waarvan 34 vrouw en 29 man. 32 Hiervan waren gynaecoloog; de meeste vrouwen waren gynaecoloog, 14 kinderartsen en 7 anderen. De gemiddelde leeftijd van alle respondenten lag boven de 40 jaar. Er zijn 4 publieke en 3 privé klinieken bezocht en 15 privé praktijken.

Conclusie. Artsen vinden het moeilijk om over seksueel overdraagbare aandoeningen te praten, er rust een taboe op seks in India, het is niet compatibel met de bestaande waarden. Dit heeft een negatief effect op de snelheid van adoptie. Deze is sowieso langzamer bij preventieve innovaties, doordat er niks gebeurt als je gebruik maakt van de innovatie; een non-event. Zowel kinderartsen en gynaecologen beweren dat ze de, wat zij als doelgroep veronderstellen, niet zien; meisjes tussen 12 en 18 jaar. Ze staan positief tegenover HPV vaccinatie, maar volgens hen komen de patiënten niet vanwege de kosten, ze moeten de overstap maken van de beslis- naar de implementatiefase. Ook zijn artsen en patiënten niet overtuigd van de veiligheid van de vaccinatie, door de recentelijke rapportages over doden. De key business leaders zeggen dat ze het als hun 'plicht' zien om te vaccineren, de

voornaamste reden om te vaccineren is om te beschermen tegen baarmoederhalskanker. Sterk overtuigde non adopters zeggen dat India nog niet klaar is voor deze vaccinatie. Eerst moet gestart worden met regelmatig screenen en voorlichting over verantwoordelijke seks. Ook moeten eerst meer voorkomende ziektes worden uitgeroeid, zoals polio, ondervoeding en bloedarmoede.

Aanbevelingen. Het is voor artsen moeilijk om over het seksgerelateerde onderwerpen te praten met patiënten. Het zou toegankelijker moeten worden om dit te bespreken, door seksuele voorlichting te geven op middelbare scholen en ervoor te zorgen dat ouders met hun kinderen gaan praten over seks. In India zijn veel mensen analfabeet en hebben nooit een opleiding gevolgd. Vrouwen zijn zich niet bewust van ziektes en preventieve maatregelen. Vrouwen moeten meer bewust worden gemaakt van hoe veel baarmoederhalskanker voorkomt in India en ze moeten gewezen worden op het belang van regelmatig screenen, dit kan bijvoorbeeld door een screen-dag in te lassen in het ziekenhuis, waar mensen informatie kunnen ontvangen over HPV en baarmoederhalskanker en waar vrouwen screening kunnen ondergaan. De familie speelt een centrale rol in de Indiase cultuur en dient betrokken, als geheel, bij de baarmoederhalskankerproblematiek. De mannen moeten overtuigd worden van het belang van screening en vaccinatie. Verder is het belangrijk dat jongere generaties bewust worden gemaakt van de gevolgen van seks. Hiervoor zullen artsen, ouders en scholen de krachten moeten bundelen. Meer verantwoordelijkheid zal bij de artsen moeten worden neergelegd, college in medische studies over hoe te adviseren op het gebied van seks.

Discussie. Het vergezellen van de sales representatives was noodzakelijk om de artsen te vinden en de interviews af te nemen en om een sample van dit formaat te krijgen. Echter, het zou een bias gegeven kunnen hebben in dit onderzoek, aangezien nu alleen de artsen bezocht zijn die al gehoord hebben van HPV vaccinatie en misschien hebben ze zich gedwongen gevoeld om sociaal wenselijke antwoorden te geven. Het was lastig om de geschikte personen te vinden in de publieke sector, aangezien MSD India de focus heeft liggen op de private sector. Soms voelden de artsen zich ondervraagd en waren niet bereid om antwoord te geven op bepaalde vragen of ze begrepen de Likert-schaal verkeerd en hebben de verkeerde box aangetikt. Voor verder onderzoek zou ik aanraden om diepte interviews te houden met uitgesproken non-adopters en om een economische analyse te doen om de ideale prijs voor vaccinatie te bepalen.

Abstract of research proposal

Introduction. In India is cervical cancer the most common cancer among women. Every year about 75 000 women die because of this disease. The WHO expect in 2025 130 000 women will die, if there is no intervention. Since 1,5 years there is an intervention available in India; HPV vaccination. The Indian healthcare system consists of a public and private market, in both markets women have to pay themselves for this vaccination. In India this will cost approximately 160 euro for the three doses needed. A lot of women are not receiving vaccination and a lot of physicians hesitate to recommend. This is a qualitative research on the drivers and barriers, which are responsible for gynecologists and pediatricians (not) to recommend the HPV vaccine to their patients.

Theoretical framework. This research is based on two theories of Everett M. Rogers' book: 'Diffusion of Innovations'. The two theories are the rate of adoption and the pattern of diffusion. Those can be measured on the basis of the items developed by Moore & Benbasat. The interview is adjusted and shortened to the subject of HPV vaccination and measured the following constructs: compatibility, complexity, image and relative advantage. Furthermore the physicians were asked what they thought the problem is concerning this vaccination.

Methods. The research was led by MSD India, conducting informed consent interviews with gynaecologists and paediatricians in the public and private healthcare sector, both adopters and non-adopters of HPV vaccination. The decision for these groups is based on the healthcare system in India and on which disciplines the focus for MSD India lays regarding HPV vaccination. The samplesize is based on feasibility and the addresses the sales representatives of MSD India visited, because they were joined 5 weeks in order to conduct the interviews. The interviews have been performed in New Delhi; they consisted of some closed and some open questions.

Results. There are 53 respondents in total, 34 females and 29 males. Of the respondents were 32 gynaecologist; most of them were female, 14 paediatricians and 7 others. The average age of all respondents was above 40 years. 4 Public and 3 private hospitals were visited and 15 private practices.

Conclusion. Physicians find it hard to talk about sexual transmitted diseases, there is resting a taboo on sex in India, it is not compatible with their values en therefore it has a negative effect on the rate of adoption. A slower rate of adoption is usual with preventive innovations because of the non-event occurring when you use it; nothing happens. Both paediatricians and gynaecologists are claiming they do not see, what they consider, the 'target' group; girls from 12 to 18 years old. They are positive about HPV vaccination, but say the patients are not coming because of the cost-factor, they have to make the step from the decision to the

implementation stage in the innovation-decision process. Physicians and patients are not completely convinced about the safety of the vaccine, because of recent death reports. Key business leaders say that they see it as their 'duty' to recommend vaccination, the main reason to provide is because it prevents from cervical cancer. Strong non-adopters say India is not yet ready for this vaccination. First should be started with regular screening and education about responsible sex. Also other, more prevalent diseases must be eradicated first, like polio, malnutrition and anaemia.

Recommendations. For physicians it is hard to talk about sex related topics. It should be more accessible to talk about that, by introducing sexual education in high schools and make parents talk about it with their children. A lot of Indian women are uneducated and illiterate, they do not know about diseases and preventive measures. They should be made aware of how common cervical cancer is in India and the importance of regular screening, for instance: introduce a screening day in hospitals, where people can receive information about cervical cancer and HPV and women can be screened. The Indian culture is very family centred; the family should be involved as a whole regarding the cervical cancer problems. Men/husbands should be convinced of the importance of screening and vaccination. Physicians, parents and schools should join forces by educating the younger generations about responsible sex. Physicians should have more responsibilities; they can be empowered by giving them courses in Medical School about counselling patients about sex.

Discussion. Joining the sales representatives was necessary to find and talk to the physicians and also to have a sample of this size. Though, it could have given a bias in the research, because now only the physicians were visited that already heard about the vaccine and maybe they felt forced to give socially desirable answers. It was difficult to find eligible physicians in the public sector, because the focus of MSD India lies on the private sector. Sometimes the physicians felt like they were interrogated and were not willing to give answers on certain questions or they did not understand the Likert-scale and check marked the wrong box. For further research I would recommend in-depth interviews with outspoken non-adopters and performing an economic analysis for the ideal price of the vaccine.

Preface

After studying at the University of Twente for four years I am heading towards my bachelor's degree in Health Sciences. In order to receive my diploma I have to do a research assignment, to display the competences I have learned the past years.

I would like to thank all the sales representatives and their managers who were willing to take me with them. Without them I could not have done my interviewing. Also the persons I met in the guesthouse of MSD I would like to thank. They helped me to shine a different light on the cultural problems I sometimes bumped into or let me taste a bit more of that culture.

Without the vaccines team I would not have known so much about HPV vaccination. Despite it was a turbulent time, they always found time to help me out. Thank you Ish, Arun, Rishi and Saurav, and also Deepshikha and Inder for their guidance. And of course I want to thank my tutor: Hindrik Vondeling, his quick e-mail reactions on my burning questions and always positive attitude towards my research.

Special thanks go to my family; Ina, Eddy and Marie-Jose. Without them my whole trip to India would not have been possible and I am very grateful for their support.

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Concepts and Abbreviations

AIIMS	All India Institute of Medical Sciences
Cervarix	HPV vaccination that is manufactured by GSK
DCGI	Drug Controller General of India
EMA	European Medicines Agency
FDA	US Food and Drug Administration
FOGSI	Federation of Obstetric and Gynaecological Societies of India
Gardasil	HPV vaccination that is manufactured by MSD
GSK	GlaxoSmithKline Pharmaceutical company that manufactures a HPV vaccination; Cervarix.
HPV	Human Papillomavirus Sexually transmitted virus that can cause sexually transmitted diseases, one of them is cervical cancer. In almost 80% of the cervical cancer cases in India you will find HPV-type 16 or 18. There are more than 100 HPV strains; a few of them can cause cancer.
IAP	Indian Academy of Pediatrics
KBL	Key Business Leader Physician who is, in terms of percentages, vaccinating a lot.
KOL	Key Opinion Leader Physician who earns a lot of respect by his colleagues.
OPD	Out Patient Department
PAP-smear	Papanicolau test Test to screen on abnormalities in the cervix of the uterus of the woman.
PAI/PCI	Perceived Attributes of Innovations Perceived Characteristics of Innovations
Physicians	In this report: gynaecologists and paediatricians
MSD	Merck Sharp and Dohme Second largest pharmaceutical company in the world, which manufactures the HPV vaccination Gardasil.
STD/STI	Sexual transmitted disease/infection
WHO	World Health Organization

1. Introduction

1.1 Introduction

Since June 2006 Gardasil was first approved in Mexico developed by Merck Sharp & Dohme (MSD) (Sanofi Pasteur MSD, 2006), in October 2008 it was released in India. (India PR Wire, 2008). Gardasil is the first vaccination against four types of the Human Papillomavirus (HPV 6, 11, 16 and 18) that can cause cervical cancer, vulvar and vaginal cancers, genital warts and abnormal and precancerous cervical, vaginal and vulvar lesions (Merck & Co, Inc., 2009).

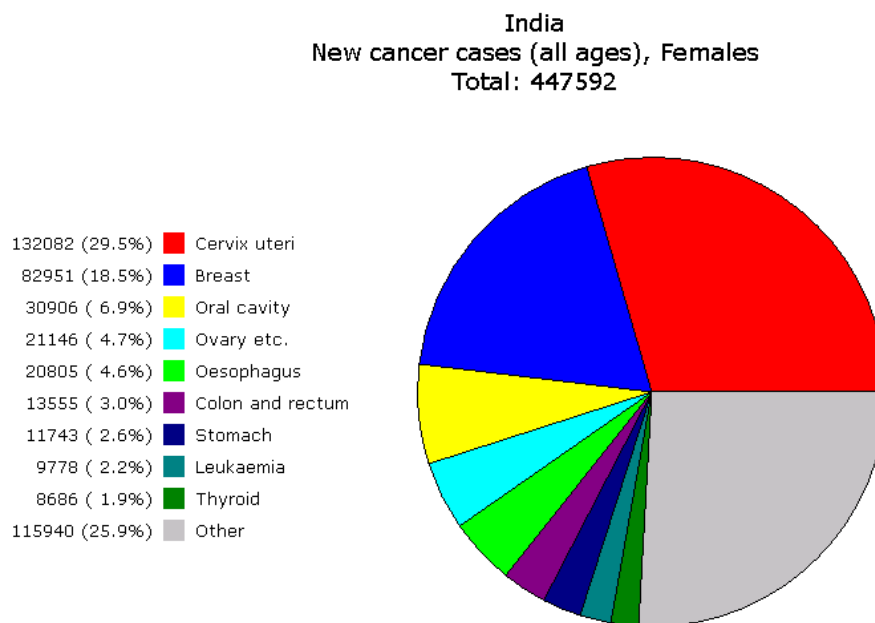
A few months later, in April 2009, came GlaxoSmithKline (GSK) with their bivalent (HPV 16 and 18) HPV vaccine on the market in India: Cervarix. Both the vaccines have the same price and mostly physicians are selling both, though, through a brand research MSD did this year, Gardasil seems to be the most used and most known vaccination among physicians.

You can say that HPV is the INUS-condition for cervical cancer; HPV is an insufficient but non-redundant part of a set of conditions, which is unnecessary but sufficient for cervical cancer (J.L. Mackie, 1974). It is indicated in girls and women 9 through 26 years and also for boys that age, to protect against genital warts. The vaccine is most effective given to girls before they have been exposed to the virus during sex. The vaccination is given as three injections over six months time (Gardasil, 2010).

In India cervical cancer is the first most frequent cancer among women (see Chart 1), it is cancer of the cervix; the lower part of the uterus that connects to the vagina, also know as the cervix uteri (India PR Wire, 2008). Of the invasive cervical cancers in India 82,5% is attributed to HPV's 16 or 18. The morbidity, as well as the mortality of cervical cancer is very high in India. The total population in India in 2005 was 1 130 618 000 people, whereof 545 543 000 women. The crude incidence rate was 26.2 per 100 000 women in 2002, which means that annually there are 132 082 new cases of cervical cancer. Every year almost 75 000 women die because of this disease, the World Health Organization (WHO) expects this to be almost doubled by 2025 to 130 000 women a year (Globocan, WHO/ICO, 2010). In their campaigns MSD India is using the slogan 'Every 7 minutes there's a woman dying of cervical cancer'. Despite this numbers far not every woman or girl in India is vaccinated against HPV and it is not included in the Indian immunization program. There are different reasons for women not getting the vaccine, lack of information and costs play a big role. Women strongly adhere to the recommendation of their healthcare provider, but a lot of healthcare providers are not discussing HPV or HPV vaccination (Rachel Caskey et al, 2009).

The purpose of this thesis is to find out which reasons can be held accountable for healthcare providers in Delhi recommending HPV vaccination, the drivers and the barriers and in which stage of adoption they are in terms of accepting HPV vaccination. Knowing that, one can develop an adequate intervention to encourage healthcare providers in India to recommend a HPV vaccination. And hopefully cervical cancer will not be the most common cancer among women in India in a few years.

Figure 1: New cancer cases in India among females, 2002



GLOBALCAN 2002, IARC

1.2 Background information

The Indian (healthcare) system requires some explanation for people who are reading this and are not Indian. There are a lot cultural factors influencing the Indian healthcare system. Most information found in this chapter is obtained through observation and personal communication.

Indian healthcare is divided in private and public, private healthcare is being practiced in private practices and private hospitals. This type of care is only affordable for the upper class. Public healthcare is provided in governmental hospitals, these are often not hygienic and badly equipped. Care in governmental hospitals is often offered free of cost or treatment against a low rate. Some vaccinations in childhood are offered free of cost for all Indian

children, these are: Tuberculosis (BCG), Polio, 3 doses Hepatitis B, 3 doses Diphtheria, Tetanus and Pertussis (DTP) and Measles (MCV). India is a very decentralized country when it comes down to the government; every state has its own parliament, government, chief minister and governor. Which means that the money in the different states is distributed in various ways. If a governor is not corrupt or focuses on healthcare, the governmental hospitals have more money to spend. Like in Tamil Nadu, where HPV vaccination is for free. Being a specialist, like a paediatrician or gynaecologist, is hard work in India. When you work as a gynaecologist in a private hospital and your patient is in labour, you are supposed to be there the whole time. From the moment the water broke to the Caesarean. A lot of physicians often work in the daytime in the hospitals and in the evening they run their own practices. This represents their 60-hour workweek, only for lunch they take plenty of time. (L. van Petersen, personal communication, 2010)

Also, you will not find privacy in the clinics. Mostly the door is not shut while the doctor is seeing a patient, even when she gets a PAP-smear; only a curtain is concealing the medical examinations. Some paediatricians have examination rooms made of glass or the rooms are not closed, so you can see and/or hear everything a patient is discussing with the physician.

Patient empowerment is unknown; the doctor is like a saint. Only the private practices are being visited by the more educated class, they will ask after HPV vaccination because they have seen TV commercials or advertisements. In India your husband's opinion is also very important; inside the house the woman is in charge, outside the house the man. You will find a lot of arranged marriages and divorces are rare. Because people are forced into marriage, extramarital relations and extramarital sex are common. The average age a girl marries is approximately 17 years and almost 20% of the pregnant women are teenage girls (PATH, 2009) (Times of India, 2004). In India there is resting a taboo on sex, it is hard for a physician to bring up this subject, which is almost inevitable when you talk about HPV. Children are very attached to the opinion of their parents, even when they are already grown. If a physician starts to talk about sexual transmitted diseases (STD) to a girl who is not yet married, the parents will feel offended.

Furthermore, Indian women are not aware of the importance of regular screening. Especially the physicians in the public market hardly have time to counsel their patients about the importance of regular screening. And even if they tell their patients, the lower class will only come to the hospital if they really need treatment. You often will find women coming in the practice with an advanced stage of cervical cancer.

Another problem that plays a role is that after a girl is married, wherefore her parents have to

pay a huge wedding (the dowry), she is part of her husbands' family and going to live with her in-laws. Having a baby girl in India, especially when you are in the lower socio economic classes, is not positive. It already is illegal to know the gender of your baby during the pregnancy. Why should you pay vaccination for a child that after 16 or 18 years is not yours anymore, who can not continue the family name and where you have to pay a huge dowry for?

One dose of Gardasil (and Cervarix) in India is about 3000 rupees (55 euros), for immunization you need three, while 34,3% of the population is living from \$1 (50 rupees) a day or less (WHO/ICO, 2009). This means that the three doses are a half-year salary for 34,4% of the people. Health insurance is not common and people who have insurance get it through their company. Health care is not something where people want to spend a lot of money on, the emphasis lies on ostentation and material things. You also see the attitude that people have when insurance is not obligatory; 'it will not happen to me' (A.P. Tyagi, personal communication, 2010).

1.3 Research question

In order to answer several questions about the diffusion and adoption of this innovation, the central research question will be:

'What are the drivers and barriers for the diffusion of HPV vaccination among physicians in New Delhi, India?'

This research assignment is commissioned by MSD India, conducted in May, June and July 2010 in India's capital New Delhi. MSD is the second-largest pharmaceutical company in the world and one of the two companies manufacturing the vaccine against HPV; Gardasil. The other vaccine is manufactured by GSK and is called Cervarix. The theories supporting my research can be found in the book 'Diffusion of innovations' by Everett M. Rogers.

I divided the main question into two sub questions:

1. *What is the pattern of diffusion of HPV vaccination in the Indian healthcare system?*
2. *What is the rate of adoption of HPV vaccination in the Indian healthcare system?*

Diffusion means *'the process by which an innovation is communicated through certain channels over time among the members of a social system'* (Rogers, 1995). Translated to my research topic it means the process by which HPV vaccination is communicated through certain channels over time among healthcare providers.

The rate of adoption is *'the relative speed with which an innovation is adopted by members of a social system. It is generally measured as the number of individuals who adopt a new idea*

in a specified period, such as each year' (Rogers, 1995).

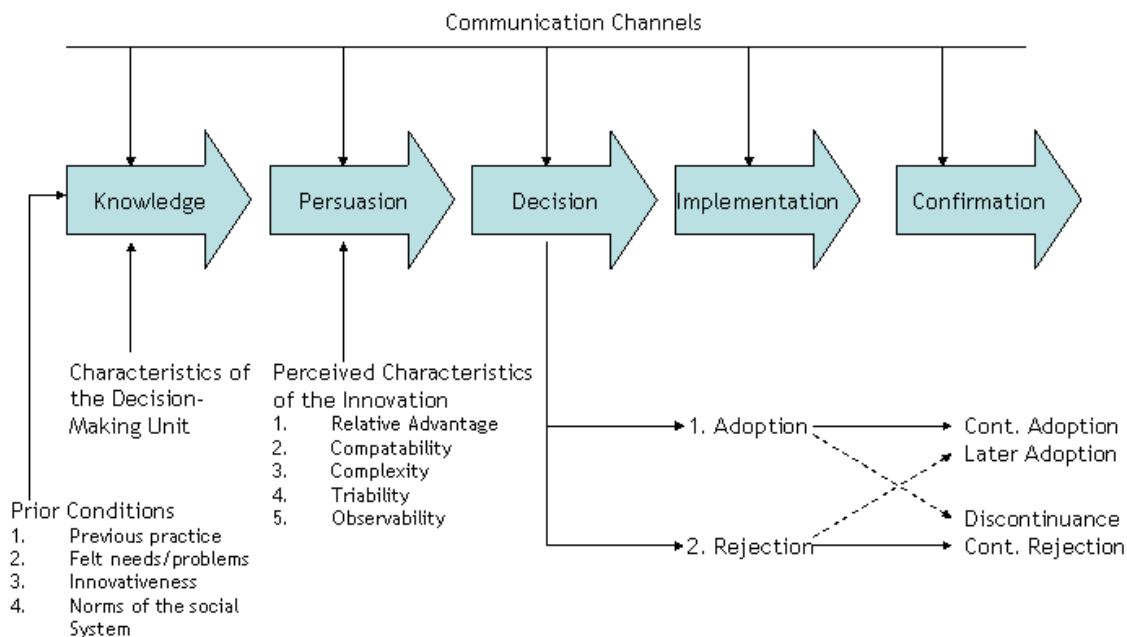
2. Theoretical framework

2.1 Pattern of diffusion

To determine the diffusion pattern, the different stages of the innovation adoption process with respect to HPV vaccination among Indian healthcare providers are studied. The five stages presented in this process are: knowledge, persuasion, decision, implementation and confirmation (Rogers, 1995). The role HPV vaccination and its adopters play in each stage will be discussed in this paragraph.

In Figure 1 presented below you see a schematic representation of the innovation-decision process. In this research is assumed that the prior conditions are met. Certainly, you can find HPV vaccination on the market and it is the first vaccination against cervical cancer, which is the most common cancer in India among women; an innovative solution to a major problem.

Figure 2: Innovation-decision process (Rogers, 1995)



2.1.1 Knowledge-stage

Understanding the innovation can reduce uncertainty. An earlier study in 2008 about HPV vaccination in Mysore, India of Karl Krupp et al., conducted among 20 physicians from different specialties and in different practice settings, reported a lack of information about the

side effects and safety of HPV vaccination among physicians. More than half of the respondents admitted that they had little or no information about the vaccine and before vaccinating they want to be completely sure that it will not harm the patient. They are scared that, if something goes wrong, the public opinion will be relentless.

There are different types of knowledge; the lack of information problem mainly lies in the awareness knowledge. Women have not heard about the existence of the vaccination, which leads to not seeking more information about how it works or when to use it. The same goes for healthcare providers; they first should be aware of the existence of the vaccination, before they can notify their patients.

To push people over the edge and increase the knowledge a cue-to-action can be introduced, such as: vaccination for free, a campaign or a congress for healthcare providers. Early knowing about an innovation relates positive to the adoption of an innovation. Rogers has developed seven generalizations about early knowers, the most important of which are: earlier knowers of an innovation have more formal education than later knowers, earlier knowers of an innovation have more exposure to mass media channels of communication than later knowers and earlier knowers of an innovation have more change agent contact than later knowers (Rogers, 1995). These generalizations can be used to develop an intervention to influence physicians and turn them into early knowers.

In India there has been a media campaign, which you will read more about at the paragraph 'communication channels'. When the vaccine was launched MSD also organized conferences for physicians.

2.1.2 Persuasion-stage

At this stage the adapters are seeking innovation-evaluation information; the expected consequences and disadvantages and advantages of vaccination.

Mortensen (2009) also reports on the so-called knowledge-attitude-practice (KAP)-gap; a discrepancy between attitude¹ and use, women claim they want to be vaccinated, but merely half of the women who said that, really is vaccinated.

You also see this gap in physicians, they have positive attitude towards vaccinating, but they do not find it appropriate in their work setting to recommend vaccination, according to Krupp (2009). Another obstacle is the high costs and the fact that HPV vaccination is optional, unless it is part of the free of cost immunization schedule people will not take it. (Krupp et al., 2009)

1 Attitude is a relatively enduring organization of an individual's beliefs about an object that predisposes his or her actions (Rogers, 1995)

The vaccine is approved by the Drug Controller General of India (DCGI), US Food and Drug Administration (FDA) and the European Medicines Agency (EMA) and recommended by the Federation of Obstetric and Gynaecological Societies of India (FOGSI) and the Indian Academy of Pediatrics (IAP) (PATH, 2010). This is positive, because physicians rely on the recommendation/approval of a professional body (Krupp et al., 2009).

2.1.3 Decision stage

Activities that a healthcare provider engages to adopt the innovation. The difficulty with a vaccination is that it is impossible to try it first to determine whether you want to use it in the future. A way to try vaccination is a trial-by-others; the experiences of a colleague that gives vaccination. A way to speed up a decision to adopt the innovation is through sponsoring. In the Netherlands some local public health agencies raffle iPods among girls who received vaccination (Frederiek Weeda, 2009).

Some adopters decide to reject the innovation; the healthcare providers who heard about the vaccination and decided not to get it. There are two types of rejection (Eveland, 1979):

1. Active rejection: hearing of the vaccination and seriously considering the adoption of it, but after having weighed benefits against risks deciding not to be vaccinated.
2. Passive rejection: hearing of the vaccination, but simply forget about it, so-called non-adoption.

2.1.4 Implementation stage

In the implementation stage the healthcare provider decides to give or not to give patients vaccination. Until this stage the process was mental. There still is a certain degree of uncertainty among the ones vaccinated, the healthcare provider should fulfil the role of change agent and give technical assistance (Rogers, 1995).

2.1.5 Confirmation stage

After having accepted vaccination and having or giving the first shot, people seek for reinforcement. The messages about HPV vaccination are very conflicting, for example serious side effects, even 15 deaths, have been reported (Gardasil-talk, n.d.). Although no link has been established between these side-effects and HPV vaccination, women and healthcare providers could be scared away after reading it or watching warning videos on YouTube (Youtube, 2007).

If somebody decides to not continue with vaccination it's called discontinuance. On the other hand, the opposite could happen. If somebody first rejected vaccination, but after having

heard positive stories of colleagues, going to a congress about HPV vaccination or being visited by a sales representative, adopts vaccination. This is called later adoption (Rogers, 1995).

2.2 Rate of adoption

In this paragraph will be discussed how the rate of adoption can be measured. Normally one will measure it by looking at the number of new adopters of an innovation in a year. In this case that was not possible, because there was no access to the data. Another obstacle is that it is only on the market for a short period of time and a lot of physicians just started –less than a year- using vaccination. There are certain variables that you can hold accountable for the rate of adoption, derived from forming an attitude towards vaccination; relative advantage, compatibility, complexity, triability and observability. Though, there must be mentioned that preventive innovations particularly slow down the rate of adoption, because individuals have difficulties in perceiving its relative advantage (Rogers, 1995).

2.2.1 Perceived attributes of innovations

Relative advantage

The degree to which an innovation is perceived as being better than the idea it supersedes. In the case of HPV vaccination the superseding idea, assuming the worst-case scenario, could be having cervical cancer.

The relative advantage for healthcare providers is having more healthy women and having less women suffering from infertility and other side effects of having (the treatment for) cervical cancer. They can put more effort into treating other diseases.

As I said, a preventive innovation has a slow rate of adoption, one of the reasons is that the rewards of being vaccinated are delayed in time and there is uncertainty about it will be needed. Though, the chance of being HPV infected as Indian women is very high (see Figure 1), Vaccination is a non-event; the absence of something that otherwise might have happened. All those factors make it difficult to perceive the relative advantage of HPV vaccination.

A way to encourage vaccination is dropping the price; another way is a communication campaign. A communication campaign intends to generate specific effects on the part of a relatively large number of individuals within a specific period of time through an organized set of communication activities (Rogers, 1995). In this particular case it would be: increasing the uptake of HPV vaccination among healthcare providers in India through, for instance, better education/information about HPV and cervical cancer in medical school.

The relative advantage is positively related to the rate of adoption.

Compatibility

Compatibility is the degree to which an innovation is perceived as consistent with the existing values, past experiences and needs of potential adopters (Rogers, 1995).

Earlier research pointed out that mothers have a strong desire to protect their children against diseases. A cultural/religious barrier towards vaccinating is the age in which vaccination is most effective; before becoming sexually active. Wong interviewed Malaysian mothers, who thought 11 years was too young to vaccinate against a sexual transmitted infection (STI). They believe that their daughters would not have sex before marriage or going to college (Wong, 2009). While two of the main causes of the high incidence of HPV in India are the early age at the first coitus and extramarital sex (Biswas, L. N., Manna, B., Maiti, P. K., Sengupta, S., 1997).

That is also a problem for healthcare providers, since the parents do not think that their daughters are sexually active and sex is a very difficult topic to talk about. (Krupp et al., 2009)

A healthcare provider who works in an environment in which his colleagues use the vaccination or who are positive about new treatments for cancer, is more likely to adopt the vaccination. The statistics at MSD have shown that a doctor who performs PAP-smears and HPV tests is more likely to counsel about HPV and to provide vaccination.

To measure if HPV vaccination is consistent with existing values, one can look to the adoption rate of other vaccines in India. Below you can find a table with the uptake of vaccination included in the national immunization program; they are for free.

Table 1: Uptake of vaccination in India, 2008 and 2005-2006

India									
2008									
Births.....	26,913,000								
Surviving infants.....	25,459,000								
Total population.....	1,181,412,000								
Infant mortality rate (per 1,000 live births).....	52								
Under-five mortality rate (per 1,000 live births).....	69								
Gross national income per capita (PPP, US\$).....	2,960								
Percentage of routine EPI vaccines financed by government.....	100%								
National coverage rates (WHO/UNICEF estimates, 2008)									
	2008	2007	2006	2005	2000	1995	1990	1985	1980
BCG	87%	87%	87%	81%	73%	81%	66%	8%	...
DTP1	83%	83%	83%	78%	77%	88%	88%	41%	25%
DTP3	66%	66%	66%	61%	58%	71%	70%	18%	6%
HepB3	21%	6%	6%	8%	...	...	...	...	...
Hib3	...	...	...	...	...	...	...	...	...
MCV	70%	70%	70%	64%	54%	72%	56%	1%	...
Pol3	67%	67%	67%	55%	60%	71%	66%	14%	2%
TT2+ (PAB)	86%	86%	86%	86%	85%	83%	81%	49%	20%

Indicators	% of Children Fully Vaccinated
NFHS-1 (1992-93)	35.4
NFHS-II (1998-99)	42.0
NFHS-III (2005-06)	43.5

(Databook for DCH, 2010), (WHO/Unicef, 2010)

The results presented at the right are provided by the WHO. The global coverage rates for measles (MCV) and the third dose of diphtheria and tetanus toxoid with pertussis (DTP3) are respectively 83% and 82%. In India are these rates lower than global, respectively 70% en 66%. These numbers even dropped compared to 1995, when apparently the government focussed on childhood vaccinations. There is no obvious increase shown in the table, except for Hepatitis, but more a fluctuating line. Also a shocking number of dying children is shown: about 1.5 million infants do not survive their first year. And even if they survive their first year, they still have a high chance of not celebrating their fifth birthday.

The results presented at the left are measured in a national family health survey conducted by the National Planning Commission of the Government of India. These results point out that the vaccination rate in India for injections in the immunization program is low, even when they are for free. Only 43,5% of the children is fully vaccinated in 2005-2006, this number hardly rose since 1998-1999, only 1,5%. This could mean that vaccination is not consistent with existing values.

Complexity

Complexity is the degree to which an innovation is perceived as relatively difficult to understand and to use.

The possible recipients as adopters can have difficulties with understanding how the vaccination works and when to use it. Many women do not know that they can receive vaccination until they are 45 years and it will work effective (Mortensen, 2010). It is also

difficult for women to understand that sex have something to do with cancer (Madhivanan et al, 2009).

The healthcare provider has to give the vaccination and must be able to discuss and explain how the vaccination works. (Rogers, 1995) Explaining the ingredients the vaccination contains could become difficult but is not necessary for adopting an innovation.

Complexity can also refer to the use of the vaccine. If it is difficult to learn how to inject the vaccines properly, it takes a lot of time to prepare or if it hurts patient, it will be less likely that the physician will provide vaccination.

Complexity is negatively related to rate of adoption.

Triability

Triability is the degree to which an innovation may be experimented with on a limited basis.

This is difficult to measure because before a medicine is presented on the market it undergoes a long track of testing. As recipient it is not possible to first try the vaccine before implementing it. As adopter of a medicine you have to rely on the advice of independent regulatory agencies, which control the safety en efficacy of medicines; like the IAP.

Healthcare providers have had a high triability to give any vaccination during their medical school. They are not able to try HPV vaccination, either you give it or you do not give it to your patient. If something goes wrong it is not possible to make it undone. On the other hand, it has already been tested before it was launched on the market.

I left this item out of my interviews, because it is not applicable on HPV vaccination.

Triability is positively related to rate of adoption (Rogers, 1995).

Observability

Observability is the degree to which the results of an innovation are visible to others. A vaccination is a non-event. There is no observability possible, because a preventive measure often is the absence of something that might have happened. Observability is positively related to rate of adoption (Rogers, 1995)

This item I also left out my interviews, because it is not applicable.

Image

Image is the degree to which the use of HPV vaccination enhances one's image or status within the organization (Izak Moore and Gary Benbasat, 1991). This attribute is added by Moore & Benbasat and is positively related to the rate of adoption. If vaccinating against HPV

will give a physician more prestige within an organization or among his colleagues, he is more likely to use it. I will use this item in my interviews instead of triability and observability.

2.2.2 Optional innovation-decision

There are three types of innovation-decisions; optional, collective and authority decisions. At this moment receiving HPV-vaccination is an optional decision. Everyone receiving vaccination individually decided to adopt this innovation. Though the decision probably also is based on interpersonal contacts; recommended by their mother or father, physician or by knowing someone with cancer, it is still an optional decision.

If in the future the vaccination would be included in the Indian immunization program it would be partially an authority innovation-decision. Being vaccinated is then strongly recommended by the government, an authority, but still an individual choice.

Decisions by authority speed up the rate of adoption, because people are forced to accept it and, as the research of Karl Krupp (2009) point out, people are more likely to accept vaccination if it is in the immunization schedule.

Some states in India bought vaccination, like Tamil Nadu, and even some governmental hospital like the All India Institute of Medical Sciences (AIIMS); they bought it for their employees.

2.2.3 Communication channels

Communication channels can be categorized as either interpersonal or mass media in nature or originating from either local or cosmopolite resources.

Mass media channels are means of transmitting messages involving a mass medium, such as radio, television, internet and so on, to reach an audience of many. Mass media can: reach a large audience rapidly, create knowledge, spread information and lead to changes in weakly held attitudes. Though, the formation of strongly held attitudes is usually accomplished by interpersonal channels. Interpersonal channels involve a face-to-face exchange between two or more individuals. These channels have greater effectiveness in dealing with resistance or apathy on the part of the potential adopter (Rogers, 1995).

A generalization stated by Rogers (1995): at the knowledge stage mass media channels are relatively more important and interpersonal channels are relatively more important at the persuasion stage. The same goes for respectively cosmopolite and localite channels. Cosmopolite channels are from outside the social system, mass media is almost entirely cosmopolite, while interpersonal channels can be either localite or cosmopolite.

A major problem in adopting HPV vaccination is the awareness of its existence; this takes place in the knowledge stage. Since December 2008 there is an advertising campaign on the Indian television, radio and at the printed media. And there are several projects, like the Gard yourself centres (GYC) and the GARD-project; guard yourself against cervical cancer through regular screening, discussion & vaccination (S. Gulati, personal communication, 18 May 2010).

Another problem for physicians is bringing up the subject of sexual diseases and sexual intercourse. Especially to talk about this with young girls is hard, because their parents will see this as an insult. They do not believe their daughters' having sex before marriage. Some counselling workshops were organized, to help physicians bring up the subject tactically. But they did not receive it well, especially the older physicians. They believed that they already knew how to counsel; therefore the workshops were not visited and did not continue. (A. Uboweja, personal communication, 2010)

2.2.4 Nature of the social system

A social system is defined as a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal. The members or units of a social system may be individuals, informal groups, organizations and/or subsystems. In this study the social system are all the adopters of HPV vaccination. The adopters are: the different kinds of healthcare providers that are vaccinating; the target group of MSD India is paediatricians, obstetricians, gynaecologists and others, like family practitioners, working in private practices and hospitals. Now they are trying to expand this to governmental hospitals. Their mutual goal is to protect against HPV vaccination and try to prevent cervical cancer (Rogers, 1995).

The social structure depends on the communication between the members of the social system. If a system is homophilous they are talking to someone similar to them about HPV vaccination. That also depends on the village where the units live; one village can be mostly against child immunization, while another village is positive about immunization. This also affects the diffusion of innovations. The same goes for the healthcare providers in the system, if they talk positive to each other about HPV vaccination it will diffuse faster among their patients. The norms and values within a system influence as well the diffusion of an innovation; it can be a barrier to change (Rogers, 1995).

As I mentioned before, it is not done in India to talk about anything related to sex. A lot of people still believe that youngsters do not have sex before marriage, while research points out that they do. Due to that physicians are holding back on recommending vaccination in the younger age groups.

2.2.5 Change agents and opinion leaders

Within a social system some members function as opinion leader. An opinion leader is able to influence other individuals' attitudes or overt behaviour informally in a desired way with relative frequency. Opinion leaders have a close conformity to the system's norms; if an opinion leader has a barrier to change, the adoption of an innovation in that system will be opposed (Rogers, 1995). MSD keeps up lists of physicians that are opinion leaders.

A change agent is an individual who influences clients' innovation-decision in a direction deemed desirable by a change agency. Sales representatives will try to influence healthcare providers and make them aware about HPV and the existence of HPV vaccination. This also happens through seminars and symposia and programs to make physicians, girls and mothers aware in collaboration with FOGSI. If the healthcare providers are convinced and aware, they will offer their patients screening, counselling and vaccination.

Though, the extent of the change agents' promotion efforts only plays a small part in the rate of adoption.

3. Research methodology

The research methods I will use to study the adoption rate and diffusion pattern of HPV vaccination in Delhi, are existing data and literature, personal communication with employees of MSD India and interviews with healthcare providers.

For the interviews the items developed by Moore and Benbasat (1991) were used, because they are measuring the perceived characteristics of innovations, as described by Rogers (1995). Moore and Benbasat (1991) developed these items for the following research 'Development of an Instrument to measure the perceptions of an Information Technology Innovation'. This was a research for an Information Technology Innovation, slightly different from a preventive medical innovation. Therefore the attributes 'observability' and 'demonstrability' were left out, as well as a lot of items because the questionnaire would be too long, minding the time shortage the physicians are facing. At least two items per attribute were included to increase reliability and validity. The items were also adjusted, so that they would fit better with the reference frame of the respondents and be more appropriate for a preventive medical innovation. A five point Likert scale was used, with the options 'agree', 'agree to some extent', 'neutral', 'disagree to some extent' and 'disagree'. 'Agree to some extent' and 'disagree to some extent' were defined as, respectively, an event occurring in 70% or 30% of the cases. The physicians also had the option to answer 'don't know' or 'not applicable'. A five-point scale was used, instead of a seven-point scale, because it was not

necessary, looking at the nature of the questions, to have seven answer options. It actually would have made it more confusing for the physicians, since they sometimes already had trouble with the five-point scale.

The open questions were based on information MSD would like to know and to determine the awareness of the physicians, to see in which stage of the innovation decision process they are and what they define as barriers or driver towards HPV vaccination. They were also meant to collect some personal characteristics.

In order to perform interviews among healthcare providers I went with the sales representatives of Gardasil, based on a schedule made by the field force of MSD. Most of the physicians had special timings for receiving sales representatives. Sometimes the sales representatives made an appointment, but most of the time that was not possible. My goal was visiting ten private or/and public gynaecologists or/and paediatricians three days a week for six weeks to perform my interviews. Performing informed consent interviews among 15 private non adopters, 15 private adopters, 15 private non adopters, 15 public adopters and 15 public non adopters. The interview consists of open questions and 16 statements about vaccination, HPV and HPV vaccination. The open questions are recorded on a voice recorder, they were semi structured. In this research 'physicians' will mean gynaecologists and paediatricians.

These groups were chosen based on the healthcare system in India; separation between public and private market, the differences in consumers found in these markets. And the decision to interview gynaecologists and paediatricians was based on where the pharmaceutical companies are focussing on regarding HPV vaccination. These disciplines receive the most eligible group.

There could be a further distribution in male or female practitioners, years of practicing and education. But for this research the sample was too small, then only a few physicians would represent a certain group. A difference between male and female could be analyzed, but far more females than males were interviewed and most of the time the gynaecologists were females and the paediatricians males.

Two days a week the interviews were analyzed and processed or the days were used to catch up delay. The interviews were analyzed and processed by scoring the statements and putting the data into Excel and SPSS and making graphs and tables to see if there were any remarkable differences. The open questions were typed out and citations were used to underpin certain findings in this research. Some statements and explanations physicians made were common among their group and these also were used to draw some conclusions.

The interviews were performed in June and July 2010.

The sales representatives keep up lists of key opinion leaders (KOL) and key business leaders (KBL) in the field. Respectively this means the physicians who have strong opinion, where a lot of colleagues are attached to and the physicians who inoculate the most. I interviewed most of the KOLs and KBLs.

4. Results

From the 53 physicians interviewed were 64% (n = 34) female and 36% (n = 19) male. Of them 62% (n = 32) were gynaecologists, 25% (n = 14) paediatricians and 13% (n = 7) other, mostly heads of a medical department. Most of the gynaecologists were females, while males often were paediatricians. The average age of the physicians in the private sector is higher than those in the public sector; respectively 49 years of age and 44 years of age, and without the medical department heads the average age in the public sector is 40 years. Only 7 physicians were practicing less than 5 years and all 53 were working for more than 20 hours a week.

The research was performed in different areas of Delhi; North West, West, South West, South, New Delhi, Central and North. In total 4 public hospitals, 3 private hospitals and approximately 15 private practices were visited. Among the hospitals were leading Indian hospitals like MAX Hospital, AIIMS and Railway Hospital. In order to visit this hospital I went with 6 sales representatives and 3 key account managers of MSD India.

Figure 3: Respondents' distribution profession, 2010

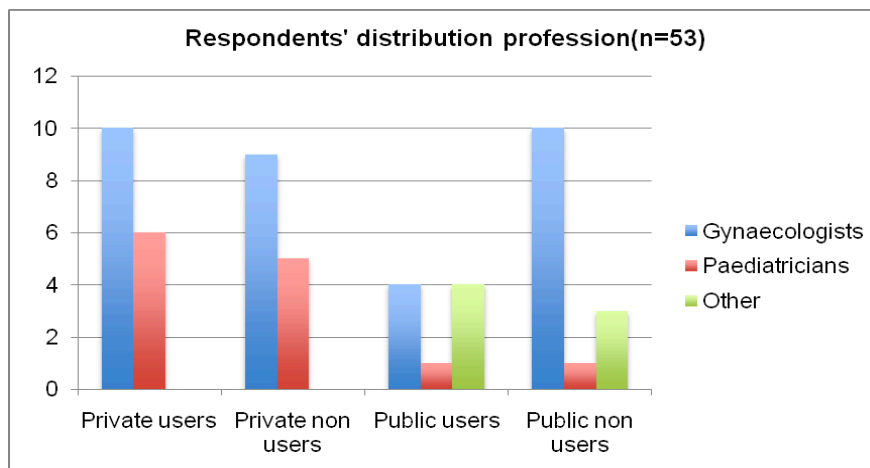
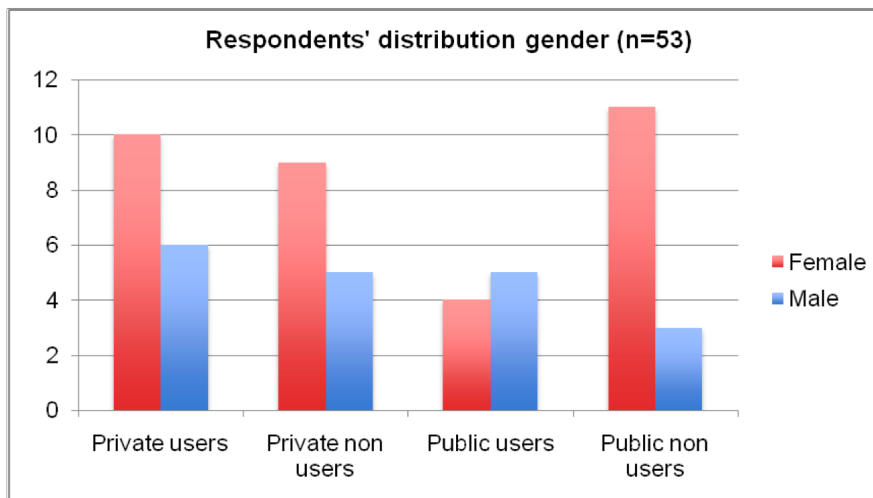


Figure 4: Respondent's distribution gender, 2010

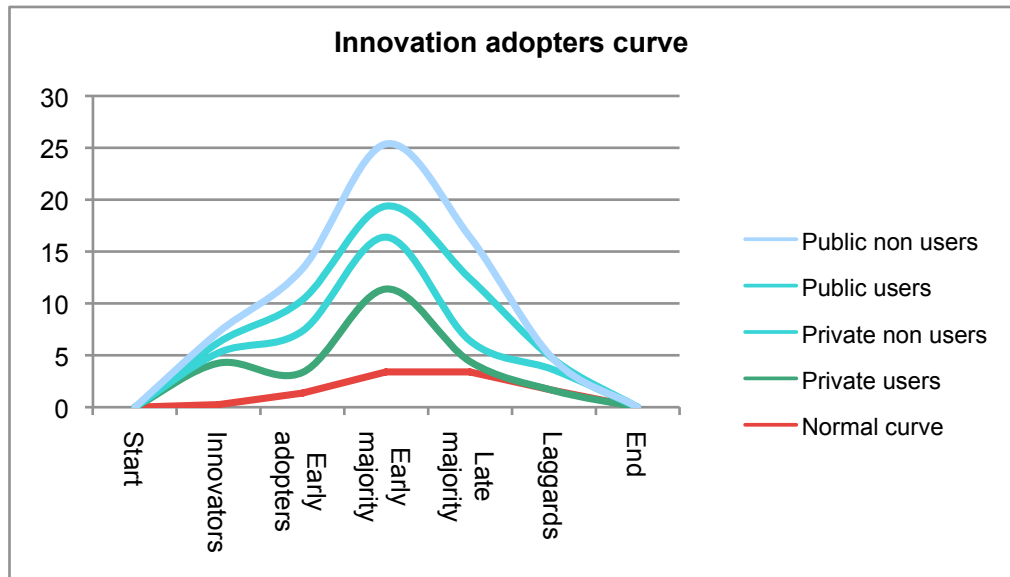


4.1 Pattern of diffusion

Every innovation has its own problems in every stage, the same goes for HPV vaccination. I asked the physicians if they were likely to be one of the first to use a new drug or vaccine or if they are waiting for their colleagues to use it first. Most of the respondents consider themselves as the adopting early majority. This means that a new vaccination should be accepted rapidly among these physicians. Though, we have to keep in mind that we are dealing with a preventive innovation. In the group of using private physicians you will find a large group of innovators and in the group of public using physicians you will find the later majority. Probably because they are forced to be the later majority; they don't have the resources to be the first ones to use a new medicine. You can also see this in the innovation curve.

The normal curve is the so-called S-curve, developed by Rogers. The percentages matching this innovators – early adopters – early majority – late majority – laggards curve, are respectively: 2,5%, 13,5%, 34%, 34%, 16% (Rogers, 1995).

Figure 5: Innovation adopters curve (cumulative); how physicians see their selves, 2010



If we bring this back to the macro data I discussed at the beginning of this paragraph, you can tell that Gardasil reached the early majority by the end of December 2009, a year after the launch of Gardasil in India.

4.1.1. Knowledge stage

The awareness of the existence of HPV vaccination among physicians is there, mostly they heard about it through literature, conferences and sales representatives. Sometimes they are not fully informed, they gave the following answers: '*Cervical cancer is the second most common cancer in India, after breast cancer*'², '*My opinion is that women don't need regular screening, only if they have complaints*'³ and '*We normally don't have illegal sex in our country [...]. In our country premarital sex is very very less*'⁴. The lack of knowledge about the importance of regular screening you will find a lot among paediatricians, they do not feel responsible about recommending regular screening, because they are not performing those tests and they are dealing with children, while they are providing the HPV vaccination. Naming types of HPV is hard and also distinguishing which brand protect against which types. The knowledge among females is lacking, especially in the lower socio-economic classes. In 2009 a parliamentary committee on petitions rejected the new Adolescence Education Programme, a comprehensive sex education programme proposed by the Ministry

² On the question: What would you explain to your patients about HPV and cervical cancer?

³ On the question: Do you also recommend regular screening?

⁴ On the question: Which patients segments' are you following? Which patients do you recommend vaccination?

of Human Resource Development (Anindita Sengupta, 2009). Parents do not have 'the talk' with their children and neither do the physicians. In the public sector the physicians often do not have time to properly counsel their patients about cervical cancer and PAP smears. Only if they already find abnormalities they will talk about it with their patients.

4.1.2 Persuasion stage

A lot of physicians heard about HPV vaccination through journals on the internet. They are looking for information about this vaccine on the internet. Especially in hospitals they will talk with their colleagues about the vaccine. Most of the physicians already passed this stage and are looking for information from professional bodies.

4.1.3 Decision stage

The sales representatives will make sure the physicians will not forget about HPV vaccination, they are covering the whole Delhi area and will answer questions of physicians in person at least once a month. In different hospitals they are organizing seminars and conferences weekly.

You will find most of the negating non-adopters in this stage; they are in the KAP-gap. They are positive about vaccination, but for unknown reasons they are not vaccinating yet. During interviews the private physicians are claiming to use vaccination, but not a lot, because they do not have the target group or because they do not want to put pressure on their patients. Or they say they are recommending it to their patients, but patients will not come back to receive it, because they find it too expensive or forget about it.

In the public sector the physicians say it is the cost factor that withholds them from recommending it to their patients, because they know they cannot afford it. Only in AIIMS and ESI hospital they are using it, but only in family and colleagues because it is for free. In ESI hospital they can prescribe it to their patients, but that hardly happens because the gynaecologists expect the patients not to follow up and then it is not cost effective at all. Though, they are convinced of the effectiveness of HPV vaccination.

4.1.4 Implementation stage

Most of the non-adopters have a positive attitude towards vaccination, though, there seems to be a gap. Both gynaecologists and paediatricians claim that they are not seeing the, what they are considering, target group; girls from 11 to 19. Most gynaecologists are not recommending because they believe vaccination is not effective in older women or it is not affordable for their patients.

Paediatricians, who are using, are mostly using it in mothers instead of children.

The physicians, who are vaccinating, gave as main reason for recommending that it prevents against HPV and cervical cancer – the most common cancer in India -. The innovators indicated that they felt it as their duty to recommend vaccination to every woman that entered the practice.

4.1.5 Confirmation stage

The physicians do not seem to mind what their colleagues think about vaccination. They seek their confirmation at the sales representatives, asking questions about vaccination during pregnancy and asking articles about the reported deaths.

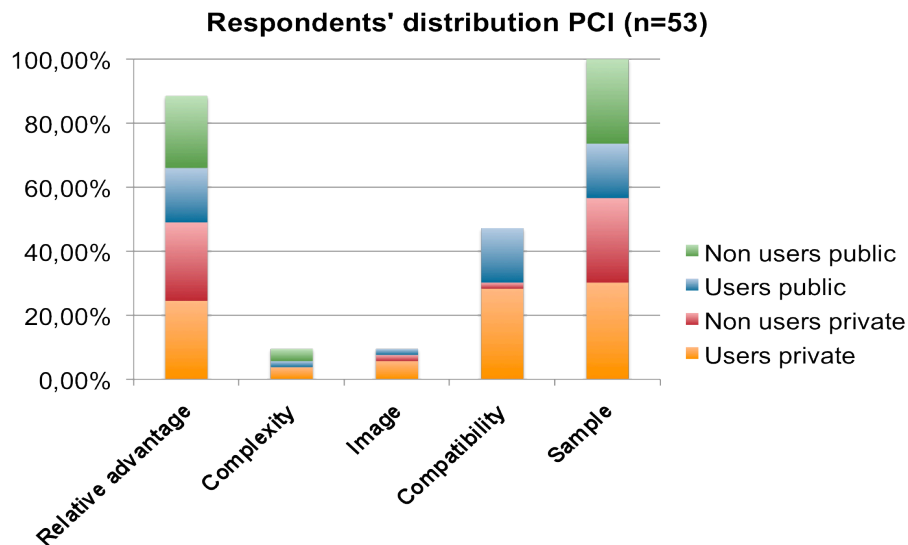
As shown in paragraph 7.1 the growth of Gardasil-adopters in India stagnated and even declined at some point, after several reports of severe side effects after receiving Gardasil in a trial (MedIndia, 2009).

Probably because of their 'saint'-status physicians are very confident and convinced of the correctness of their own acts. Only in April 2010 you found physicians falling back from the confirmation to the decision stage.

4.2 Rate of Adoption

The rate of adoption can be measured by the number of individuals that adopt an innovation in one year. I do not have the numbers of both the HPV vaccinations; Gardasil and Cervarix, only from Gardasil. Gardasil was launched in India by the end of 2008, Cervarix in April 2009. Until April 2010 the use of HPV vaccination showed a rising line. Due to negative reactions in the media the numbers dropped, in April 2010 there are 0.6% less gynaecologists, 2,8% less paediatricians and 68,9% less others vaccinating Gardasil than in December 2009. This means that of the private market 46% and 37,5% was using Gardasil in respectively December 2009 and April 2010 (S. Gulati, personal communication, 18 May 2010).

Figure 6: Respondents' distribution of Perceived Characteristics of Innovations (PCI), 2010



4.2.1 Relative advantage

Most of the physicians in all groups agree on that the advantages of using HPV vaccination far outweigh the possible disadvantages, even the physicians who are not vaccinating against HPV. Though, they indicate that the cost-factor plays a major role for their patients. If they convinced the patients of the usefulness of the vaccine and they bring up the price, the patients back out; say they will come back later. They are scared by the rumours and the gynaecologists do not believe in recommending vaccination to older women.

A strong non-adopter told me that there were so many more problems in India, so many more diseases that could be cured easier and cheaper, like undernourishment and anaemia. She felt like that there was a wrong message going out to the public. Women would come to her practice asking for the vaccine and believing they would be protected against cervical cancer and by giving it to their daughters, they believed their daughters would not need sexual education. They felt that their duty towards educating their daughters about responsible sex was done. Also, she had seen that the vaccinated women will not come back for regular screening.

She also felt like the media and pharmaceutical companies were scaring the bigger crowd, who can not afford vaccination. Women in the lower socio economic classes now think that they are definitely going to die of cervical cancer.

4.2.2 Compatibility

On the statement if vaccinating against HPV fits with the way physicians like to take care of their patients and if HPV vaccinating fits with the values that are central to the physicians, answered most of the using physicians with 'agree'. The physicians, except for one, who were not using answered these statements in denial⁵ with 'disagree' or 'slightly disagree'. All the physicians I spoke were pro vaccination in general and pro preventive measures.

Among vaccinating physicians compatibility is high and among non vaccinating physicians it is low. Which means that physicians that are not vaccinating against HPV, would like to be vaccinating. In the private sector the non adopters are blaming the patients for not coming back after agreeing on receiving vaccination and in the public sector it is a matter of the medical board that does not approve vaccination, because they can not afford it. If it would be approved in public hospitals for every patient, there would not be budget left for other treatments. While a large chunk of that budget now goes to cancer treatments.

Only bringing up the subject of HPV as a sexual transmitted disease, as I mentioned before, was not consistent with their values and especially the values of their patients. Especially in the private sector among pediatricians this plays a role, a pediatrician explained. There is a problem with compatibility in terms of appropriate topics to talk about to adolescent patients in a practice. Paediatricians feel like it is more a gynaecologist thing, because it is about a women's disease and why should a men that deals with children bring up a women's disease, mothers would find it strange to hear them talk about that. While some gynaecologist's say that they hardly see girls that have not been sexually active yet or girls that have not attended menarche – in the age group of 9, 10, 11, 12- , so paediatricians should do it.

Furthermore, the pediatricians will give preference to the childhood vaccinations, one pediatrician who was not using described it like this: *'The first ethical question comes to the doctor: 'Should we give priority to the cervical cancer?'. There is a whole list of vaccines and even that we can't complete.'*

4.2.3 Complexity

The use of the injection is easy; physicians do not have a problem inoculating the vaccine.

⁵ Not vaccinating against HPV fits with the way I like to take care of my patients.

Not providing HPV vaccination fits with the values that are central to me, as a physician.

They also were indicating that patients are coming back for all the three doses. Physicians in public market experienced difficulty in explaining to their patients they still need regular screening and it does not protect 100% against cervical cancer, only against certain types of the virus that may cause cervical cancer.

It is difficult to understand for patients that they are not going to die of cervical cancer if they have an HPV infection and they can still receive vaccination. Also making clear that once you are vaccinated, you will still need regular screening. These things are hard to explain in public market because patients are uneducated and illiterate, they will not understand.

4.2.4 Image

Among all the groups most of the physicians disagree on the statement that says that vaccinating against HPV gives them more prestige or colleagues see them as an example because they are vaccinating against HPV. Though, private non-adopters did not want to admit that they are not using, which could be an image issue. Furthermore MSD keeps up a list of KOLs and KBLs, which means that there are physicians who have more prestige and who play an important role towards acceptance of HPV vaccination.

5. Conclusions and Discussion

5.1 Conclusions

The rate of adoption seems to be going fast, except for the part that it stagnated in April 2010. If it proceeds to be going like this you might expect that all private physicians are using in April 2011. Though, the most physicians that accepted vaccination are in the private market, that is were MSD India is also focussing on, so only the private market will be growing like this. The data of adoption in the public market are unknown to me, one can expect that the rate of adoption is much slower there, because hospitals have a budget and it would be too expensive to give the patients HPV vaccination for free.

To speed up the process, the most important characteristic to look at is compatibility. Physicians should be feeling more comfortable with recommending vaccination.

In the pattern of diffusion a lot of physicians are stuck in the decision phase. They are positive about vaccination, the sales representatives will make sure they do not forget about it, but they are not flowing to the implementation stage automatically. This is not strange, because from there on the mental process becomes a physical process. They have to suit the action to the word. It is also a characteristic for a preventive innovation like HPV vaccination; you will often find there a KAP gap. A way to narrow this gap is a cue-to-action;

make women aware of the threat that cervical cancer forms in India and drop the price (Rogers, 1995).

To increase the uptake of vaccination among physicians as well as consumers, it is important to increase the awareness first. After the awareness is increased, MSD can start with dropping the price of the vaccine. Below I will illustrate the measures and manners to meet these conditions. The text is originally written for MSD India, the parts that are in *Italics* represent my personal opinion on the topic.

- **Sexual education** A problem on the side of the physicians, especially for the pediatricians, is to talk about sex. This problem should be solved first to increase the awareness. It is almost inevitable when you talk about HPV vaccination to talk about sexual transmitted diseases. In medical school they could introduce a few courses about how to counsel about responsible sex and sexual transmitted diseases. At this moment nobody feels responsible to inform adolescents about the risks of unsafe sex. As well schools, as doctors, as parents should join forces to educate their children.

The culture is too conservative to let physicians consult about sexual topics; it might take years to change these thoughts and traditions.

In 2009 the Ministry of Human Resource Development introduced a new Adolescence Education Programme, which was rejected. They should revise this programme, maybe adjust it a bit, and try to get it through the parliamentary committee. Then there could be given sexual education in high schools, which will lead to more awareness about STD's.

Physicians should be made aware of their key role; they have the information, the knowledge and possibilities to inform their patients. They have to translate the scientific language to something understandable for the public. No one is closer to help reduce the cervical cancer cases in India than they are. It is not done for them to start talking about sex to their patients, but for whom is it in India? The time shortage they suffer from, causing withholding the physicians from counseling patients, can be solved by setting up a special information desk at the gynecology department.

Women often have to wait for their turn a long time in public hospitals, time enough for them to step by. In the private hospitals you will find a lot of television screens with advertisements, MSD could place an advertisement on those screens.

And last but not least: the parents. They have to get used to the idea that their children do have sex before marriage. Maybe they are not agreeing on it, but recognizing is better than ignoring it. There is not much what can be done about this case, the television will play an important role. Already there are American series on the Indian television, but censored. In the lower classes poverty plays a role in the early sexual involvement; daughters are prostituted at young ages to bring in money for the family. Hopefully this is a matter of time.

- **Involvement husbands** In most households the man is in charge. Therefore it is important to also inform men about women's health, screening and vaccination. They should be involved in advertising campaigns and maybe special flyers for men about the disease. Now you only see women with their daughters in the advertisement campaigns, while cervical cancer affects the whole family and in India family plays an important role, more than in the Western societies. If men are convinced they will send their wives and daughters to the practitioner. Families are hard parties to influence, because they have their own values where they believe in. They live in one house with several generations and pass on traditions and beliefs.

The traditions and cultural beliefs play a big role on the side of the consumers. Physicians are educated and literate; it is easier to convince them of the effectiveness of the vaccine. But to make a country of millions of people aware of a disease, when there are not even enough doctors for the whole population, where children work instead of going to school and when there are still people suffering from polio and tuberculosis, that is hard to achieve.

- **Costs** The major problem physicians are facing are the costs. Most physicians are not recommending in the first place because they already know this vaccine is too expensive for their patients. There was no difference between public and private physicians, adopters or non-adopters, everybody brought up the high costs as main factor. A solution to this problem, which also can be found in Rogers' 'Diffusion of Innovations', is dropping the price of vaccination. Most of the children are not even vaccinated against diseases like measles and tuberculosis, which vaccines are provided by the Indian government for free and already common in Europe. This is partly caused by the lack of follow up; the lower socio economic classes are hard to reach, most of them are living in the rural areas, with the first hospital dozens of kilometers away, and they are often not staying in one and the same place. Only for polio health workers go door to door, for other –free- vaccinations people should

come to the hospitals (A.P. Tyagi, personal communication, 2010). It is important for the lower socio economic classes to get vaccinated, since the presence of cervical cancer is the highest there (British Journal of Cancer, 2009).

MSD is participating in a program to give vaccination away for free in developing countries; Gardasil Access Program, and a trail to demonstrate vaccination. Since inception of the program, organizations and institutions in Bhutan, Bolivia, Cambodia, Cameroon, Georgia, Ghana, Haiti, India, Kenya, Kiribati, Lesotho, Moldova, Nepal, Nicaragua, Nigeria, Papua New Guinea, Tanzania, Uganda, and Uzbekistan have been approved to receive more than 716 500 doses of Gardasil to gain operational experience in the design and implementation of HPV vaccination projects in their countries (Gardasil Access Program, 2010). They are planning to spread 3 million doses in total, over 18 developing countries. Unfortunately, even if India got all the 3 million doses, it is not enough. Not even one generation can be vaccinated against HPV with those doses. An idea would be to expand this program.

India is a developing country; 8 states have more poor people, 421 million, than 26 poorest African countries combined, 410 million, regarding the Multidimensional Poverty Index (MPI) (Daily News and Analysis, 2010). Furthermore, it is a big country, officially they are a democracy, but in the decentralized governments you will find a lot corruption. Even the most basic things can not be provided, for instance safe roads or running water, and governmental laws are not followed up. This brings us to the next point; these diseases, which are controlled in the western countries for decades, should be eradicated first. What is the point of vaccinating someone against HPV, if she is likely to have hepatitis, diphtheria or polio? Vaccinations that are for free. The money that is spent on one dose of HPV vaccination could be used to feed 300 malnourished children for one day. I believe that it is not cost effective enough yet in India.

A trial was started in the states Gujarat and Andhra Pradesh, the government stopped this trial after too many reports on side effects and even death reports. They were all proven not to have a link with Gardasil. The trial should be started as soon as possible, to take the doubts away and to make results visible as soon as possible. Data at MSD pointed out that screening leads to vaccinating. If screening can be done for free this might lead to more awareness among women. Not only women, but even physicians are underestimating the importance of screening. It all starts with preventive screening. Screening in combination with vaccination is the most effective measure against cervical cancer. In a few months time there will be research

conducted in the rural areas of India about the opportunities to provide self screening kits to women there. If they find possibilities to provide women these kits, this can lead to more screening and finally vaccinating.

An affordable price can be derived from the prices of other vaccines. And a research can be done among physicians, about what the minimal margin on a medicine must be before they provide it and what they think is an affordable price for their patients, and a research among consumers, what an affordable price is for the three dose vaccination. The best solution will be to include this vaccine in the national Immunization Program, but before this happens there is a long way –of other vaccinations- to go.

The point of pediatricians is understandable; their priority lies with the childhood vaccinations. If you already know people cannot afford vaccination and they do not even get the medication they really need, what is the point in 'scaring' them with new necessary vaccines. In my opinion it is too early for India to benefit from this vaccine. Even if it was provided for free, people will not come to get it or will not receive the three doses. Especially to reach the rural areas and to make people fully aware of what this vaccination protects against. First things first and one step at the time are the terms to be used right now.

5.2 Discussion

Because I was an intern at MSD India I did not have access to all the data they already conducted or it was not allowed to publish data in my research. Therefore I could not determine the rate of adoption in numbers, like the physicians that adopted vaccination in one year. Or the targets MSD India determined regarding Gardasil.

Joining the sales representatives on their visits to physicians was necessary to find the physicians and also was very informative. I really needed to be in the field to understand and see what was going on in the Indian healthcare system. Besides, I do not think that I would have got any response if I conducted my research through internet or telephone. It was very hard to find a non-adopter who wanted to speak up, because they did no further research on the topic. Most of the time non-adopters were claiming that they did use, while the sales representatives told me they were not stocking, neither Gardasil, nor Cervarix. Fortunately I found two strong non-adopters, who could bring in a lot for my research.

The sales representatives knew some physicians were not using or slightly using (so-called trialists), but if you asked them after their uptake, the physicians always claimed they were

adopters. When I found out this was happening I adjusted my questionnaires a bit from 'not using' into 'slightly using'. This was not very helpful because the physicians were not outspoken, they always said it was due to their patients that they were not or slightly using and they were fully supporting vaccination. Fortunately I met two physicians who were outspoken, and they underpinned their decision not to vaccinate with several arguments. I tried to meet more of those non-adopters through them, but they never reacted on my attempts to contact them. Luckily they were very extensive in their explanations and summarized they came to the same conclusions, while they did not know each other. So probably other non-adopters would have given me the same answers.

Recording the open questions made sure the physicians gave more information than they probably would have done if they had to write it down. Two physicians did not want to be recorded, they wrote their answers down and they were obviously less extensive. It also gave me the opportunity to ask questions based on the answers they gave and sometimes ask for a broader explanation. The most important was that it helped me to be really quick with my interviews, writing takes more time than talking and time shortage was a barrier I had to deal with.

MSD India is more focussing on the private market; it is more likely for women who are visiting the private practices to buy HPV vaccination. Women in the public healthcare are less educated and the vaccination is often too expensive. Therefore it was difficult to interview public physicians who were vaccinating. Interviewing public physicians in general was difficult because they do not have much time; it was only allowed to speak to them after OPD, before lunch and then sales representatives of all pharmaceutical companies wanted to speak to them.

In order to conduct my interviews I joined 6 sales representatives and 3 key account managers to cover almost all New Delhi area. It was very helpful because I would have never found all those physicians myself. First I went a few days with them, not interviewing, to explore the market, to estimate how much time I had for my interviews and see how to approach the physicians. I started interviewing a week later.

The sales representatives answered questions for physicians or physicians were giving politically correct answers, this could have biased my research. It was notable that all the physicians were visited before by sales representatives of MSD, because they were giving the same answers to some questions. On the other hand; without them I would not have interviewed more than 50 physicians in six weeks time, which made my research more reliable.

Furthermore, there was not always time to ask everything I wanted, most of the time I visited the physicians without an appointment and patients always come on the first place. Second, my research was conducted during the Indian summer holidays, which meant that physicians were not always in the office. I also noticed, when I was reading the answers on the statements afterwards, that some of the physicians might have given the 'wrong' answers; they did not read the questions properly. Some of the older physicians also found my system with the Likert-scale and the dots difficult to fill out and some of the non-adopters found it difficult to answer questions with a denial. This was not a major problem, because I had the opportunity to read out the statements or explain what some statements meant. And if I saw that a physician filled out something that did not fit with the way he answered my open questions, I had the opportunity to ask them about it.

Finally, a few physicians, particularly paediatricians, felt like they were tested on their knowledge about HPV and cervical cancer, sometimes they even rejected to participate or asked if they could study first before answering the questions. On a certain point I had to decide to let the questions: 'What is HPV and cervical cancer according to you' and 'What strains of HPV do you know of?' out. Also, later I heard that physicians are tended to give answers that are an easy way out for them. They will say that the cost factor is the main factor, because then the problem will not be on their plate. Sometimes I tempted them and the sales representatives by telling them about the situation in the Netherlands; low HPV vaccine uptake, despite it is for free. But they kept to the record that in India it was the cost factor.

For further research I would recommend to perform some in-depth interviews with physicians who are strong non-adopters. Ask them about what they think solutions are to increase the uptake of HPV vaccination, maybe put them in a focus group setting to create a concrete plan how to tackle the cervical cancer and vaccination problems. They are in the field every day for years and understand the problems better than somebody who is only there for three months.

To prevent a systematic bias it would also be useful to do research without the company of a third party who has interests in selling vaccination. They can be inadvertently pushing the respondent in the 'right' direction.

The major problem lies with the lower classes, which hardly go to the hospitals. A research conducted in the rural areas among physicians/health workers and women would maybe illuminate other problems. The same goes for India as a country, India is as big as Europe and in every state you will find differences in culture, language and healthcare. To generalize

the research to India, there must be research conducted in different states.

And I certainly would do research on the barriers and drivers among consumers, originally I planned to interview consumers also, but since I was an employee of MSD, it was not allowed to interview consumers by the law of privacy. MSD is now outsourcing a consumer research to a third, independent party. Unfortunately this research is delayed; otherwise I would have included some data in this research.

References

Literature

- Biswas, L. N., Manna, B., Maiti, P. K., & Sengupta, S. (1997). Sexual risk factors for cervical cancer among rural Indian women: a case-control study. *Int J Epidemiol*, 26(3), 491-495.
- *British Journal of Cancer* (2009) **101**, 865–870. doi:10.1038/sj.bjc.6605224. Published online 4 August 2009. Retrieved on July 16, 2010, from: <http://www.nature.com/bjc/journal/v101/n5/full/6605224a.html#bib37>
- Daily News and Analysis (2010). Acute poverty in 8 India states, says new UNDP measure. Retrieved on August 10, 2010, from: http://www.dnaindia.com/india/report_acute-poverty-in-8-indian-states-says-new-undp-measure_1408795
- Economical and Social Commission for Asia and the Pacific (2009). Statistical Yearbook for Asia and the Pacific – 18. Poverty and Inequality. Retrieved on June 2, 2010, from: <http://www.unescap.org/stat/data/syb2009/18-Poverty-and-inequality.asp>
- Gardasil Access Program (2010), Merck Sharp and Dohme Corp. Retrieved on July 21, 2010, from: <http://www.gardasilaccessprogram.org/index.php>
- Gardasil.com (2010), Merck & Co., Inc. Safety and patient product information. Retrieved on January 20, 2010, from: <http://www.gardasil.com/Gardasil-facts/index.html>
- Gardasil-talk (n.d.). Retrieved on March 13, 2010, from: http://www.gardasil-talk.com/?page_id=2
- Garland, S., Park, S. N., Ngan, H. Y., Frazer, I., Tay, E. H., Chen, C. J., et al. (2008). The need for public education on HPV and cervical cancer prevention in Asia. Opinions of experts at the AOGIN conference. *Vaccine*, 26(43), 5435-5440.
- India PR Wire (2008), *MSD India launches GARDASIL - India's first Human Papillomavirus (HPV) Vaccine to help prevent Cervical Cancer*. Retrieved March 15, 2010, from: <http://www.indiaprwire.com/pressrelease/medical/2008101414217.htm>
- Krupp, K., Marlow, L.A.V., Kielmann, K., Doddaiiah, N., Mysore, S., Reingold, A.L., Madhivanan, P. (2009). Factors associated with intention-to-recommend human papillomavirus vaccination among physicians in Mysore, India. *Journal of Adolescent Health* 46 (2010), 379-384.
- Mackie, J.L (1974). *The Cement of the Universe: A Study of Causation*. Oxford University Press, 62.
- Madhivanan, P., Krupp, K., Yashodha, M. N., Marlow, L., Klausner, J. D., & Reingold, A. L. (2009). Attitudes toward HPV vaccination among parents of adolescent girls in Mysore, India. *Vaccine*, 27(38), 5203-5208.
- MedIndia (2009). *Government halts cervical cancer vaccine trials after deaths*. Retrieved June 14, 2010 from: <http://www.medindia.net/news/Government-Halts-Cervical-Cancer-Vaccine-Trials-After-Deaths-67825-1.htm>
- Mortensen, G.L. (2010). *Drivers and barriers to acceptance of human-papillomavirus vaccination among young women: a qualitative and quantitative study*. BMC Public Health, Volume 10.
- Moore, G. C., Benbasat, I. (1991). Development of an Instrument to measure the perceptions of an Information Technology Innovation. Retrieved April 9, 2010 from:

- <http://pages.cpsc.ucalgary.ca/~boyd/699/mitchell/Moore%20and%20Benbasat.pdf>
- PATH (2009). Shaping a strategy to introduce HPV vaccines in India. Retrieved June 2, 2010, from: http://www.rho.org/files/PATH_FRTS_India.pdf
 - PATH (2010). Update on PATH's HPV vaccine project in India. Retrieved June 14, 2010, from: <http://www.path.org/news/an100422-hpv-india.php>
 - Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
 - Sanofi Pasteur MSD (2006), *Consumer Press Release: Cervical Cancer Vaccine Available in the UK*. Retrieved February 20, 2010, from: <http://www.spmsd.co.uk/docnews.asp?catid=57&docid=716>
 - Sengupta, A. (2009, August 16). India in denial over sex education. *The Guardian*. Retrieved July 5, 2010, from: <http://www.guardian.co.uk/commentisfree/2009/aug/16/sex-education-india>
 - Times of India (2004). 'I think condoms ruin the fun'. Retrieved on June 14, 2010, from: <http://timesofindia.indiatimes.com/articleshow/msid-944905,curpg-3.cms>
 - WHO/ICO Information Centre on HPV and Cervical Cancer (HPV Information Centre). Human Papillomavirus and Related Cancers in India. *Summary Report 2009*. Retrieved on January 20, 2010, from: http://apps.who.int/hpvcentre/statistics/dynamic/ico/country_pdf/IND.pdf?CFID=3579606&CFTOKEN=26465649
 - Weeda, F. (2009). NRC-Handelsblad. *Laat je inenten en win een iPod*. Retrieved on March 11, 2010, from: http://www.nrc.nl/binnenland/article2157896.ece/Laat_je_inenten_en_win_een_iPod
 - Wong, L. P. (2009). Preventing cervical cancer through human papillomavirus vaccination: perspective from focus groups. *J Low Genit Tract Dis*, 13(2), 85-93.
 - YouTube (2007). The HealthRanger. Gardasil HPV Vaccine Hoax Exposed. Retrieved on March 12, 2010, from: <http://www.youtube.com/watch?v=XK97CHQZhq0>

Figures and Tables

- *Figure 1*: Globocan (2002), IARC, *India New cancer cases (all ages), Females*. Retrieved February 20, 2010, from: <http://www-dep.iarc.fr/GLOBOCAN/pie.asp?country=356&type=1&sex=2&submit=Execute&colour=1&size=2&output=1>
 - *Figure 2*: Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press.
 - *Figure 3*: Based on collected data from the interviews
 - *Figure 4*: Based on collected data from the interviews
 - *Figure 5*: Based on collected data from the interviews, normal curve based on data found in Rogers, E. M. (1995). *Diffusion of innovations* (4th ed.). New York: Free Press, pp 257
 - *Figure 6*: Based on collected data from the interviews
 - *Table 1*: WHO/Unicef (2010), *Immunization Summary 2008 data*. Retrieved on March 15, 2010, from: http://www.childinfo.org/files/Immunization_Summary_2008_r6.pdf
- Databook for DCH (2010). Planningcommission Government of India, Data/Statistics > Data

Appendix

Appendix A: Informed consent

Informed consent form for participants of the questionnaire about HPV vaccination

You are being invited to take part in a research study, titled: 'Diffusion of HPV vaccination among physicians in Delhi, India'. This consent form has information to help you decide if you want to participate. Take your time, read this form carefully, and ask any questions you may have.

I am Margoleen Honcoop, working for MSD Pharmaceuticals India and the University of Twente in the Netherlands (Europe).

This research will involve your participation in a questionnaire of sixteen statements and some open ended questions. The questions are based on a diffusion and adoption model to measure the diffusion and adoption of HPV vaccination in India among physicians. In total it will take 5 to 10 minutes.

To participate I request you to fill out a survey, which will be provided and collected by me, Margoleen Honcoop.

If you do not wish to answer any of the questions included in the survey, you may skip them and move on to the next question. The information recorded is confidential; your name is not being included on the forms.

Participant

I confirm that I have read and understood the information provided for the research titled: 'Diffusion of HPV vaccination among physicians in Delhi, India'. I have had the opportunity to ask questions about it and they have been answered to my satisfaction. I understand that my participation is voluntary. I agree to take part in the study.

Name of Participant:

Signature of Participant:

Date:

Statement by the Researcher

I have accurately read out the information sheet to the participant and to the best of my ability made sure that the participant understands that the following will be required to be done:

1. Fill out a survey

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered satisfactorily. I confirm that the participation is voluntary and the participant has agreed to participate in the study.

Margoleen Honcoop

Signature:

Date:

Appendix B: Questionnaire adopters: private physicians

Interview vaccinating healthcare provider private

Age:

Educational degree:

Practicing for:

0 < 5 year

0 > 5 year

Using HPV vaccination since:

1. What is the Human Papillomavirus (HPV) and what is cervical cancer according to you?

2. What strains of HPV do you know of?

3. How many patients per month are receiving vaccination?

4. And are they all completing the three doses?

5. Who or what made you aware of vaccination?

6. Reason(s) to provide vaccination (multiple answers possible):

0 Overall excellent vaccine

0 Recommendation by colleagues

0 Recommendation by professional body

0 Having a relative with cancer

0 High margins

0 Advertising

0 To prevent cervical cancer

0 MSD/GSK convention, scientific meeting

0 Other;...

7. I would like to know your perception of risk of cervical cancer, which patients' segments you are following and vaccinating (multiple answers possible):

0 Patients with low Socio-economic status

0 Patients with high Socio-economic status

0 Sexually active patients

0 Not sexually active patients

0 9 – 16 years old

0 17 – 26 years old

0 26 years and onwards

0 High risk behaviour

Questionnaire

A few statements concerning HPV-vaccination, there are no wrong answers.

The answer categories are:

D = Disagree

DS = Disagree to some extent (stated event happens in 30% of the cases or less)

N = Neutral

SA = Agree to some extent (stated event happens in 70% of the cases or more)

A = Agree

NA = Not applicable

DK = Do not know

Question	D	DS	N	SA	A	*	NA	DK
1. If there is a new drug/vaccine on the market, I always am one of the first to use it.	0	0	0	0	0	*	0	0
2. Until I start using a new drug/vaccine I wait for all my colleagues to use it first.	0	0	0	0	0	*	0	0
3. The decision to offer HPV vaccination was made on a voluntary basis.	0	0	0	0	0	*	0	0
4. My patients expect me to provide HPV	0	0	0	0	0	*	0	0

vaccination.								
5. I believe that current HPV vaccines are difficult to use (e.g. to inject).	0	0	0	0	0	*	0	0
6. I spend enough time with my patient for counseling about cervical cancer and HPV vaccine.	0	0	0	0	0	*	0	0
7. Being vaccinated against cervical cancer makes it easier to stay healthy for my patients.	0	0	0	0	0	*	0	0
8. Providing HPV vaccination gives me greater opportunity to promote my patients' health/wellbeing.	0	0	0	0	0	*	0	0
9. The advantages of providing vaccination against HPV would far outweigh the potential disadvantages and adverse events.	0	0	0	0	0	*	0	0
10. I would have no difficulty explaining to my patients why HPV vaccination may or may not be beneficial.	0	0	0	0	0	*	0	0
11. Vaccinating against HPV fits with the way I like to take care of my patients.	0	0	0	0	0	*	0	0
12. Providing HPV vaccination fits with the values that are central to me, as a physician.	0	0	0	0	0	*	0	0
13. Colleagues in my environment who provide HPV vaccination have more prestige than those who do not.	0	0	0	0	0	*	0	0
14. Colleagues see me as an example, because I am vaccinating against HPV.	0	0	0	0	0	*	0	0
15. I would have no difficulty telling colleagues about my experiences of providing HPV vaccination.	0	0	0	0	0	*	0	0
16. I recommend all my female patients to receive HPV vaccination	0	0	0	0	0	*	0	0

Appendix C: Questionnaire adopters: public physicians

Interview vaccinating public healthcare provider

Age:

Educational degree:

Practicing for:

0 < 5 year

0 > 5 year

Using HPV vaccination since:

1. What is the Human Papillomavirus (HPV) and what is cervical cancer according to you?

2. What strains of HPV do you know of?

3. How many patients per month are receiving vaccination?

4. And are they all completing the three doses?

5. Who or what made you aware of vaccination?

6. Reason(s) to provide vaccination (multiple answers possible):

0 Overall excellent vaccine

0 Recommendation by colleagues

0 Recommendation by professional body

0 Having a relative with cancer

0 High margins

- 0 Advertising
- 0 To prevent cervical cancer
- 0 MSD/GSK convention, scientific meeting
- 0 Other;...
- 7. I would like to know your perception of risk of cervical cancer, which patients' segments you are following and vaccinating (multiple answers possible):
- 0 Patients with low Socio-economic status
- 0 Patients with high Socio-economic status
- 0 Sexually active patients
- 0 Not sexually active patients
- 0 9 – 16 years old
- 0 17 – 26 years old
- 0 26 years and onwards
- 0 High risk behaviour

Questionnaire

A few statements concerning HPV vaccination, there are no wrong answers.

The answer categories are:

D = Disagree

DS = Disagree to some extent (stated event happens in 30% of the cases or less)

N = Neutral

SA = Agree to some extent (stated event happens in 70% of the cases or more)

A = Agree

NA = Not applicable DK = Do not know

Question	D	DS	N	SA	A	*	NA	DK
1. If there is a new drug/vaccine on the market, I always am one of the first to use it.	0	0	0	0	0	*	0	0
2. Until I start using a new drug/vaccine I wait for all my colleagues to use it first.	0	0	0	0	0	*	0	0
3. The decision to offer HPV vaccination was made on a voluntary basis.	0	0	0	0	0	*	0	0
4. HPV vaccination is approved by the department/hospital/medical board.	0	0	0	0	0	*	0	0
5. I believe that current HPV vaccines are difficult to use (e.g. to inject).	0	0	0	0	0	*	0	0
6. I spend enough time with my patient for counseling about cervical cancer and HPV vaccine.	0	0	0	0	0	*	0	0
7. Being vaccinated against cervical cancer makes it easier to stay healthy for my patients.	0	0	0	0	0	*	0	0
8. Providing HPV vaccination gives me greater opportunity to promote my patients' health/wellbeing.	0	0	0	0	0	*	0	0
9. The advantages of providing vaccination against HPV would far outweigh the potential disadvantages and adverse events.	0	0	0	0	0	*	0	0
10. I would have no difficulty explaining to my patients why HPV vaccination may or may not be beneficial.	0	0	0	0	0	*	0	0
11. Vaccinating against HPV fits with the way I like to take care of my patients.	0	0	0	0	0	*	0	0

12. Providing HPV vaccination fits with the values that are central to me, as a physician.	0	0	0	0	0	*	0	0
13. Colleagues in my environment who provide HPV vaccination have more prestige than those who do not.	0	0	0	0	0	*	0	0
14. Colleagues see me as an example, because I am vaccinating against HPV.	0	0	0	0	0	*	0	0
15. I would have no difficulty telling colleagues about my experiences of providing HPV vaccination.	0	0	0	0	0	*	0	0
16. I recommend all my female patients to receive HPV vaccination	0	0	0	0	0	*	0	0

Appendix D: Questionnaire non-adopters: private physicians

Interview not vaccinating healthcare provider private

Age:

Educational degree:

Practicing for:

0 < 5 years

0 > 5 years

1. What is the Human Papillomavirus (HPV) and what is cervical cancer according to you?

2. What strains of HPV do you know of?

3. Do you recommend regular screening?

4. Who or what made you aware of the existence of HPV vaccination? Resource?

5. On which reason(s) is your decision based not to provide HPV vaccination to your patients?

0 Low margins

0 Discouraged by colleagues

0 Reports about adverse effects

0 I do not believe in vaccination

0 Screening is a better option

0 I do not see a relevant patient profile

0 Other;...

Questionnaire

A few statements concerning HPV-vaccination, there are no wrong answers.

The answer categories are:

D = Disagree

DS = Disagree to some extent (stated event occurs in 30% of the cases or less)

N = Neutral

SA = Agree to some extent (stated event occurs in 70% of the cases or more)

A = Agree

NA = Not applicable DK = Do not know

Question	D	DS	N	SA	A	*	NA	DK
1. If there is a new drug/vaccine on the market, I always am one of the first to use it.	0	0	0	0	0	*	0	0
2. Until I start using a new drug/vaccine I wait for all my colleagues to use it first.	0	0	0	0	0	*	0	0

3. The decision not/slightly to offer HPV vaccination was made on a voluntary basis.	0	0	0	0	0	*	0	0
4. My patients expect me not/slightly to provide HPV vaccination.	0	0	0	0	0	*	0	0
5. I believe that current HPV vaccines are difficult to use (e.g. to inject).	0	0	0	0	0	*	0	0
6. I spend enough time with my patient for counseling about cervical cancer and HPV vaccine.	0	0	0	0	0	*	0	0
7. I think being vaccinated against cervical cancer would make it easier to stay healthy for my patients.	0	0	0	0	0	*	0	0
8. Providing HPV vaccination would give me greater opportunity to promote my patients' health/wellbeing.	0	0	0	0	0	*	0	0
9. I think the advantages of providing vaccination against HPV would far outweigh the potential disadvantages and adverse events.	0	0	0	0	0	*	0	0
10. I would have difficulty explaining to patients why HPV vaccination may or may not be beneficial.	0	0	0	0	0	*	0	0
11. Not/Slightly vaccinating against HPV fits with the way I like to take care of my patients.	0	0	0	0	0	*	0	0
12. Not/slightly providing HPV vaccination fits with the values that are central to me, as a physician.	0	0	0	0	0	*	0	0
13. Colleagues in my environment who provide HPV vaccination have more prestige than those who do not.	0	0	0	0	0	*	0	0
14. My colleagues see me as an example, because I am not/slightly vaccinating against HPV.	0	0	0	0	0	*	0	0
15. I would have difficulty telling colleagues about my experiences of providing HPV vaccination.	0	0	0	0	0	*	0	0
16. I would recommend all my female patients to receive HPV vaccination.	0	0	0	0	0	*	0	0

Appendix E: Questionnaire non-adopters: public physicians

Interview not vaccinating healthcare provider public

Age:

Educational degree:

Practicing for:

0 < 5 years

0 > 5 years

1. What is the Human Papillomavirus (HPV) and what is cervical cancer according to you?
2. What strains of HPV do you know of?
3. Do you recommend regular screening?
4. Are you aware of the existence of HPV vaccination?
5. Who or what made you aware of the existence of HPV vaccination?

6. On which reason(s) is your decision based not to provide HPV vaccination to your patients?

- 0 Low margins
- 0 Discouraged by colleagues
- 0 Reports about adverse effects
- 0 I do not believe in vaccination
- 0 Screening is a better option
- 0 I do not see a relevant patient profile
- 0 Other;...

Questionnaire

A few statements concerning HPV vaccination, there are no wrong answers.

The answer categories are:

D = Disagree

DS = Disagree to some extent (stated event happens in 30% of the cases or less)

N = Neutral

SA = Agree to some extent (stated event happens in 70% of the cases or more)

A = Agree

NA = Not applicable DK = Do not know

Question	D	DS	N	SA	A	*	NA	DK
1. If there is a new drug/vaccine on the market, I always am one of the first to use it.	0	0	0	0	0	*	0	0
2. Until I start using a new drug/vaccine I wait for all my colleagues to use it first.	0	0	0	0	0	*	0	0
3. The decision not to offer HPV vaccination was made on a voluntary basis.	0	0	0	0	0	*	0	0
4. HPV vaccination is not approved by the department/hospital/medical board.	0	0	0	0	0	*	0	0
5. I believe that current HPV vaccines are difficult to use (e.g. to inject).								
6. I spend enough time with my patient for counseling about cervical cancer and HPV vaccine.	0	0	0	0	0	*	0	0
7. I think being vaccinated against cervical cancer would make it easier to stay healthy for my patients.	0	0	0	0	0	*	0	0
8. Providing HPV vaccination would give me greater opportunity to promote my patients' health/wellbeing.	0	0	0	0	0	*	0	0
9. I think the advantages of providing vaccination against HPV would far outweigh the potential disadvantages and adverse events.	0	0	0	0	0	*	0	0
10. I would have difficulty explaining to patients why HPV vaccination may or may not be beneficial.	0	0	0	0	0	*	0	0
11. Not vaccinating against HPV fits with the way I like to take care of my patients.	0	0	0	0	0	*	0	0
12. Not providing HPV vaccination fits with the values that are central to me, as a physician.	0	0	0	0	0	*	0	0
13 Colleagues in my environment who provide	0	0	0	0	0	*	0	0

HPV vaccination have more prestige than those who do not.								
14. My colleagues see me as an example, because I am not vaccinating against HPV.	0	0	0	0	0	*	0	0
15. I would have difficulty telling colleagues about my experiences of providing HPV vaccination.	0	0	0	0	0	*	0	0
16. I would recommend all my female patients to receive HPV vaccination.	0	0	0	0	0	*	0	0

Appendix F: Constucts

Constructs & Operationalization

Constructs	Question	D	DS	N	SA	A	NA	DK
Early adopter	1. If there is a new drug/vaccine on the market, I always am one of the first to use it.	1	2	3	4	5	0	9
Early adopter	2. Until I start using a new drug/vaccine I wait for all my colleagues to use it first.	5	4	3	2	1	0	9
Voluntariness	3. The decision to offer HPV vaccination was made on a voluntary basis.	1	2	3	4	5	0	9
Awareness	4. My patients expect me to provide HPV vaccination.	1	2	3	4	5	0	9
Complexity	5. I believe that current HPV vaccines are difficult to use (e.g. to inject).	1	2	3	4	5	0	9
Intention to recommend	6. I spend enough time with my patient for counseling about cervical cancer and HPV vaccine.	1	2	3	4	5	0	9
Relative advantage	7. Being vaccinated against cervical cancer makes it easier to stay healthy for my patients.	1	2	3	4	5	0	9
Relative advantage	8. Providing HPV vaccination gives me greater opportunity to promote my patients' health/wellbeing.	1	2	3	4	5	0	9
Relative advantage	9. The advantages of providing vaccination against HPV would far outweigh the potential disadvantages and adverse events.	1	2	3	4	5	0	9
Complexity	10. I would have no difficulty explaining to my patients why HPV vaccination may or may not be beneficial.	5	4	3	2	1	0	9
Compatibility	11. Vaccinating against HPV fits with the way I like to take care of my patients.	1	2	3	4	5	0	9
Compatibility	12. Providing HPV vaccination fits with the values that are central to me, as a physician.	1	2	3	4	5	0	9
Image	13. Colleagues in my environment who provide HPV vaccination have	1	2	3	4	5	0	9

	more prestige than those who do not.							
Image	14. Colleagues see me as an example, because I am vaccinating against HPV.	1	2	3	4	5	0	9
Complexity	15. I would have no difficulty telling colleagues about my experiences of providing HPV vaccination.	5	4	3	2	1	0	9
Intention to recommend	16. I recommend all my female patients to receive HPV vaccination	1	2	3	4	5	0	9

Appendix G: Timeline

Weeks	What to do	Done
17	Departure	
18	First week at MSD, be introduced.	Went to medical affairs, adjusted my interviews. Thinking about how to find enough, not-biased respondents.
19	Discuss my proposal, how to find respondents.	Went to market research department, they told me I could not interview consumers, only physicians. Compliance told me my interviews have to be approved by the vaccination team (Inder) and medical affairs (Anuj). Contacting mr. Vondeling.
20	Day 1 & 2, in the field: ten interviews with physicians. Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India. Send update to Utwente	Try to plan an appointment with Inder and Anuj to approve my interviews. Adjusting my research proposal. Get information about Gardasil marketing campaigns. Went do Inder, clarity about interviews, approval etc.
21	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India 27th feast day: Buddha Punima in India.	Joining the salesreps for two days. Adjusting my plan. Try to contact Anuj, ended up with Anup, for the final approval of my interviews. Plan to start Tuesday next week in consultation with the field force.
22	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD	Monday, talked to Anup, got approval. Tuesday & Wednesday went with the field force, did 10 interviews. 9 private vaccinating, 1

	India.	public vaccinating
23	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India. Send update to Utwente	Wednesday, Thursday, Friday fieldwork. Did 12 interviews, 7 private vaccinating, 1 public vaccinating, 3 private non vaccinating, 1 public non vaccinating, 1 not participant
24	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India.	Wednesday, Thursday, Friday field. Did 9 interviews, 9 vaccinating public physicians.
25	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India.	Wednesday, Thursday, Friday field Monday; sick. Tuesday updated Inder. Wednesday, Thursday, Friday fieldwork, did 10 interviews; 10 not vaccinating private physicians. Completed that group. Saturday; RTM > sick
26	Day 1 & 2, in the field: ten interviews with physicians Day 3 & 4, at the office: Write and analyse interviews and interpret results. Day 5, at the office: Report my findings to MSD India. Send update to Utwente.	Tuesday; embassy Wednesday; thanking salesreps. Thursday & Friday, writing on my thesis. Send third version to Utwente. Contacting Nitesh Shamla about my field work.
27	Extra week in case of delay, maybe extra interviews.	Monday, Thursday; office. Working on thesis and presentation. Tuesday, Wednesday, Friday field with Akhil, Sanjeev and Navish, public market.
28	Day 1 to 4 at the office: Write down the results in my report, ask questions, possibly interpret results from week before in case of delay. Day 5, at the office: Discuss my report with MSD India and University of Twente.	
29	Day 1: Writing my final report, with adjustments and discussion. Day 2: Feast: Rath Yatra Day 3: Present my report at MSD. Day 4 & 5: Working out possible comments from presentation; recommendations. Write internship report. Get a report of MSD India about my internship and advice about my grade.	

Appendix H: Items developed by Moore and Benbasat (1991)

INTRODUCTORY EXPLANATION

Items are listed by construct.

"a seven-point Likert scale ranging from 'extremely disagree' to 'extremely agree' [was] chosen as the response format." (pages 198-199)

The PWS [personal work station] was defined in the instructions accompanying the questionnaire as a set of computerized tools designed for an individual. It was indicated that the PWS "usually consists of a personal or microcomputer with one or more software packages, such as a word processing program or a spreadsheet, or a computer terminal hooked up to a central mainframe computer again with the appropriate software." (page 208)

ITEMS

Construct: Voluntariness

1. My Superiors expect me to use a PWS.
2. My use of a PWS is voluntary (as opposed to required by my superiors or job description).
- 3.* My boss does not require me to use a PWS.
- 4.* Although it might be helpful, using a PWS is certainly not compulsory in my job.

Construct: Relative Advantage

- 1.* Using a PWS enables me to accomplish tasks more quickly.
- 2.* Using a PWS improves the quality of work I do.
- 3.* Using a PWS makes it easier to do my job.
4. The disadvantages of my using a PWS far outweigh the advantages (See Note a.)
5. Using a PWS improves my job performance.
6. Overall, I find using a PWS to be advantageous in my job.
- 7.* Using a PWS enhances my effectiveness on the job.
- 8.* Using a PWS gives me greater control over my work.
9. Using a PWS increases my productivity.

Construct: Compatibility

- 1.* Using a PWS is compatible with all aspects of my work.
2. Using a PWS is completely compatible with my current situation.
- 3.* I think that using a PWS fits well with the way I like to work.
- 4.* Using a PWS fits into my work style.

Construct: Image

1. Using a PWS improves my image within the organization.
2. Because of my use of a PWS others in my organization see me as a

more valuable employee. (See Note a.)

3.* People in my organization who use a PWS have more prestige than those who do not.

4.* People in my organization who use a PWS have a high profile.

5.* Having a PWS is a status symbol in my organization.

Construct: Ease of use

1. I believe that a PWS is cumbersome to use.

2. It is easy for me to remember how to perform tasks using a PWS.

(See Note a.)

3. My using a PWS required a lot of mental effort.

4. Using a PWS is often frustrating.

5.* My interaction with a PWS is clear and understandable. (See Note a.)

6.* I believe that it is easy to get a PWS to do what I want it to do.

7.* Overall, I believe that a PWS is easy to use.

8.* Learning to operate a PWS is easy for me.

Construct: Result Demonstrability

1.* I would have no difficulty telling others about the results of using a PWS.

2.* I believe I could communicate to others the consequences of using a PWS.

3.* The results of using a PWS are apparent to me.

4.* I would have difficulty explaining why using a PWS may or may not be beneficial.

Construct: Visibility

1. I have seen what others do using their PWS.

2.* In my organization, one sees PWS on many desks.

3. I have seen a PWS in use outside my firm. (See Note a.)

4.* PWS are not very visible in my organization.

5. It is easy for me to observe others using PWS in my firm.

I have had plenty of opportunity to see the PWS being used. (See Note b.)

I have not seen many others using a PWS in my department. (See Note b.)

Construct: Triability

1. I've had a great deal of opportunity to try various PWS applications.

2. I know where I can go to satisfactorily try out various uses of a PWS.

3. A PWS was available to me to adequately test run various applications.

4.* Before deciding whether to use any PWS applications, I was able to properly try them out.

5.* I was permitted to use a PWS on a trial basis long enough to see what it could do.

I am able to experiment with the PWS as necessary. (See Note b.)

I can have PWS applications for long enough periods to try them out. (See Note b.)

I did not have to expend very much effort to try out the PWS. (See Note c.)

I don't really have adequate opportunities to try out different things on the PWS. (See Note c.)

A proper on-the-job tryout of the various uses of the PWS is not possible. (See Note c.)

There are enough people in my organization to help me try the various uses of the PWS. (See Note c.)

NOTES

- a. The indicated items were all deleted as the result of the first factor analysis and hence were not in the final scales.
- b. The indicated items, which were deleted after the initial test, are suggested as candidates for inclusion in any expanded scale.
- c. The indicated items, which were not in the final instrument, had item-scale correlations less than 0.40 in the initial test and are suggested as secondary candidates for lengthening the scale.
- d. * indicates items suggested for inclusion in any "short" scales.