Vaccination Status of Children in Switzerland

Inauguraldissertation

zur

Erlangung der Würde eines Doktors der Philosophie
vorgelegt der
Philosophisch-Naturwissenschaftlichen Fakultät
der Universität Basel

von

Phung Lang

aus Uzwil-Henau, SG
und Springfield, MA, USA

Zürich, 2007

Genehmigt von der Philosophisch-Naturwissenschaftlichen Fakultät

auf Antrag von

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Basel, den 27. März 2007

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Acknowledgements

This work is a collaboration between the Institute for Social and Preventive Medicine (ISPMZ), the Office of the Chief Medical Officer (CMO) in 26 cantons and the Swiss Federal Office of Public Health (SFOPH), with help kindly provided by many municipalities, the Departments of Health and Education, school physicians, school / "Lungenliga" nurses, school officials and parents. Without their participation this survey would not have been possible. I am especially grateful to the CMOs and their assistances, who spent many patient hours explaining the school health and immunization policies in their cantons, aided in data collection or generously shared their database for analysis. To all the school doctors and the school / "Lungenliga" nurses who helped collect the vaccination cards and completed the vaccination summary forms, along with parents who participated in the survey, my warmest thank you.

My sincerest thanks to Prof. Robert Steffen for his supervision and unending support throughout this thesis project. Always available, he permitted experimentation, coupled with trial and error that nurtures independence and problem-solving skills, characteristics necessary for future success. My deepest appreciation to Dr. Hanspeter Zimmermann for the hours of critical discussions on methodology, particularly data collection, development of the questionnaire, preparation of the manuscripts and clarification regarding all aspects of immunization. Resources and financial support were strategically and gratefully provided by Dr. Daniel Koch. To Professors Marcel Tanner, Charlotte Braun-Fahrländer, and Felix Gutzwiller I owe many thanks for their support and encouragement during the study period. A special thanks to Prof Christoph Hatz and Niklaus Weiss for filling in at the last minute.

Deepest gratitude is due to Dr. Philip Smith from the National Immunization Survey from the CDC for helping develop the sampling methodology and statistical analysis. I enjoyed the many hours spent in discussion, not only concerning the survey.

Greatest appreciation to my colleagues at ISPMZ, especially Ursula Piller who helped collect the data and coordinate the survey while providing companionship throughout the study period. Oh, how wonderful for a 90% participation level! Vaccination inquiries were always directed towards Maia Funk whose door and ears were always gratefully open. For their encouragement and administrative assistance I thank Pat Schlagenhauf, Astrid Bruderer, Cordy Küderli, Margot Mütsch and Melanie Müller. I owe special thanks to Hanspeter Jauss for perpetual and invaluable technical help, along with Alois Tschopp and Valentin Rousson for computer and statistical support.

To my family and friends in the US and here in Switzerland, who have encouraged me to continue this endeavor and given me many hours of free daycare, I am eternally grateful. I dedicate this work to Cornel, Anna, Sara and Jack.

Financial Support

Funding was provided by the SFOPH, Bern, and the Health Departments in Cantons Glarus and St. Gallen for the Vaccination Coverage Survey 1999-2003. In addition to the SFOPH, 25 cantons provided financial and / or resource support to continue the survey in 2005-07.

Summary

Despite being recognized as one of the most effective public health measures, vaccination has become increasingly controversial as more parents and doctors question the effectiveness and purpose of this preventive measure, with heightened emphasis on adverse events [Abrahamson and Pickering, 2002; Campion, 2002]. The goals of our study were to determine immunization coverage and examine factors influencing vaccination behaviors in 3 different age groups in each canton by collecting vaccination cards and questionnaires between 1999 and 2003. National coverage estimates for 3 doses of diphtheria (Di or D), tetanus (Te or T), pertussis (Per or P), poliomyelitis (Pol) and *Haemophilus influenzae* type B (Hib) and combined dose of measles (M), mumps (M), and rubella (R), or simply MMR, were: over 91% for Di, Te, Per, Pol and Hib and around 81% for MMR for toddlers; they were more than 92%, for 4 doses of Di, Te and Pol, 60.9% and 26.6% for 4 doses of Per and Hib, respectively, and 87% for one dose of MMR for children at school entry. For children at school departure, coverage estimates at 5 doses of Di, Te and Pol was over 81% and around 50% for 2 doses of MMR (approximately 93% for 1 dose). Hepatitis B coverage ranged between 2.3% and 88.3% with the mean at 1 dose being 46.3%, for 2 doses at 40.8%, and 3 doses at 25.9%. Due to methodological difficulties, comparison of coverage for schoolchildren among the cantons should be done with caution. Comparison of coverage for toddlers for MMR at one dose and Di, Te, and Pol at 3 doses with those from 1991 and 1998 revealed that coverage has remained relatively unchanged. However, for Per and Hib at 3 and 4 doses and 4 doses of Di, Te, and Pol, coverage levels have increased, with the uptake of Hib being most apparent, climbing from 77% in 1998 to 91% in our survey at 3 doses and from 47% to 79% at 4 doses.

Vaccination coverage is significantly better in cantons where French or Italian is the predominant language spoken as compared to their German counterparts, particularly for MMR. Cantons supplementing their school health services with *cantonally employed school nurses or "Lungenliga" nurses have improved* vaccination coverage as compared to those working only with school doctors. *Parental use of alternative medicine* is found most often to be strongly associated with low vaccination coverage, cutting across cantonal differences and types of vaccines while being more influential by parents of younger kids. *Nationality* follows suit, with Swiss children having lower MMR and higher Di and Pol coverage levels than those of foreign background. Approximately 90% of all those who completed a questionnaire indicated that they have information concerning vaccination. Of these, 67% are satisfied with what they have, while 17% are not happy, 7% remained undecided and 8% refrained from answering. Future vaccination campaigns should address the latter 3 groups to effectively increase immunization coverage.

Finally, doctors are one of the most important resources for parents for obtaining information regarding vaccination; however, parents prefer that doctors actively share this information, rather than having to request for it from the doctors themselves. Parents of schoolchildren increasingly rely on school physicians for this information as their children get older. Health insurance should also share more information with parents while information distributed by the media is less desired. *Parental attitudes towards vaccination* and *perception of the dangers of the childhood preventable diseases and vaccine safety and efficacy* are significantly associated with coverage. Our results show that the most significant predictors of a child being UTD with the recommended vaccination plan is if parents agree that they follow the doctor's recommendation, believe in the

effectiveness of vaccination, and think that as many children as possible should be vaccinated for the benefit of the community. In contrast, toddlers whose parents thought there was too much social pressure to vaccinate their children and have concerns about possible side effects from vaccines are less likely to be vaccinated as compared to those who disagree.

In summary, children in Switzerland are sub-optimally vaccinated. Immunization coverage is affected by demographic and political factors, attitudes towards vaccination and perceptions of the dangers of the disease, as well as information available to the parents and healthcare providers. Future vaccination campaigns must address these factors, while providing clear and transparent resources to the parents and healthcare professionals.

Zusammenfassung

Obwohl Impfungen als eine der wirksamsten Massnahmen zur Förderung der öffentlichen Gesundheit gelten, hat ein Teil der Bevölkerung diesbezüglich Bedenken [Abrahamson and Pickering, 2002; Campion, 2002]. Deshalb wurde das Institut für Sozial- und Präventivmedizin der Universität Zürich beauftragt die Durchimpfung von Kindern in drei verschiedenen Altersgruppen in allen Kantonen zwischen 1999 und 2003 anhand der Impfausweise zu erheben und die Faktoren, welche das Impfverhalten beeinflussen mittels Fragebogen zu untersuchen. Die durchschnittliche nationale Rate mit drei Dosen Diphtherie- (Di / D), Tetanus- (Te / T), Pertussis- (Per / P), Poliomyelitis- (Pol) und *Haemophilus influenzae* Typ b- (Hib) sowie einer Dosis Masern-, Mumps-, und Röteln- (MMR-) Impfung war wie folgt: über 91% bei Di, Te, Per, Pol und Hib und rund 81% bei MMR bei den Kleinkindern, und mit vier Dosen über 92% bei Di, Te und Pol, 60,9% bei Per, 26,6% bei Hib und 87% bei einer Dosis MMR bei Schuleintrittskindern. Bei den Schulaustretenden war das Impfniveau mit 5 Dosen Di, Te, und Pol über 81% und rund 50% bei zwei Dosen MMR (rund 93% bei einer Dosis). Bei dieser Altersgruppe schwankte die Deckung für Hepatitis B zwischen 2,3% und 88,3% mit dem Mittelwert für eine Dosis bei 46,3%, für zwei Dosen bei 40,8%, und drei Dosen bei 25,9%. Aufgrund methodischer Schwierigkeiten ist der Vergleich bei den Schulkindern zwischen den verschiedenen Kantonen mit Vorsicht zu betrachten. Der Vergleich der Durchimpfung von Kleinkindern mit einer Dosis MMR und je drei Dosen von Di, Te und Pol zwischen den Jahren 1999-2003 (diese Studie) und den Jahren 1991 und 1998 zeigt, dass der Impfgrad ungefähr gleich blieb. Für drei und vier Dosen Per und Hib und vier Dosen Di, Te, und Pol ist die Durchimpfung gestiegen, wobei Hib

am offensichtlichsten von 77% im Jahr 1998 auf 91% in unserer Erhebung bei 3 Dosen und von 47% auf 79% bei 4 Dosen gestiegen ist.

Im Vergleich zur Deutschschweiz ist die Durchimpfung in Kantonen in denen mehrheitlich französisch oder italienisch gesprochen wird signifikant höher, speziell für MMR. In Kantonen in welchen das Schulgesundheitssystem von kantonal angestellten Krankenschwestern oder Schwestern der Lungenliga unterstützt wird, ist das Impfniveau höher als in Kantonen die ausschliesslich mit Schulärzten arbeiten. Bei Anwendung von Alternativmedizin durch die Eltern, wird die Impfquote vor allem bei jüngeren Kindern stark beeinflusst, unabhängig von kantonalen Unterschieden und Art der Impfung. Schweizer Kinder haben eine tiefere MMR-, jedoch eine höhere Di- und Pol- Durchimpfung als ausländische Kinder. Etwa 90% der Personen die einen Fragebogen ausgefüllt haben gaben an, dass sie Informationen bezüglich Impfungen erhalten haben. Von diesen 90% sind 67% zufrieden mit den erhaltenen Informationen, 17% sind damit unzufrieden; 7% waren unentschlossen und 8% beantworteten diese Frage nicht. Zukünftige Impfkampagnen sollten die letzteren 3 Gruppen speziell ansprechen um den Durchimpfungsgrad zu erhöhen.

Ärztinnen und Ärzte sind die wichtigsten Bezugspersonen der Eltern bezüglich Informationen über Impfungen; die Eltern bevorzugen jedoch, aktiv informiert werden und nicht selbst nachfragen zu müssen. Eltern von Schulkindern verlassen sich mit zunehmendem Alter der Kinder mehr und mehr darauf, dass sie von den Schulärzten mit Informationen versorgt werden. Die Eltern wünschen sich auch mehr Informationen von den Krankenkassen, während Infos durch die Medien weniger gefragt sind. Die elterliche Einstellung gegenüber Impfung im Allgemeinen, sowie die Einschätzung von Impfrisiken und Gefährlichkeit von

Kinderkrankheiten, haben den grössten Einfluss auf die Durchimpfungsraten. Gemäss den Resultaten unserer Studie sind die verlässlichsten Voraussetzungen für das Einhalten des empfohlenen Impfplans: Die Eltern folgen den Empfehlungen des Arztes, glauben an die Wirksamkeit der Impfung, und wissen, dass für das Erreichen einer „Herdenimmunität“ möglichst viele Individuen geimpft sein müssen. Kleinkinder, deren Eltern den sozialen Druck ihre Kinder impfen zu lassen als zu gross empfinden oder mögliche Nebeneffekte von Impfungen befürchten, haben eine geringere Durchimpfungsquote.

Ein Vergleich der Daten der Jahre 1999 und 2003 im Kanton Wallis zeigt, dass bei den Kleinkindern die Durchimpfung mit 3 Dosen Di, Te, Per und Pol sowie einer Dosis MMR gesunken, jene mit 2 Dosen MMR jedoch gestiegen ist. Bei den Schulkindern ist die Impfniveau in diese Zeit signifikant gestiegen. Die Teilnahme an unserer Studie ist zwischen 1999 und 2003 ebenfalls verbessert, wahrscheinlich wegen der verbesserten Datenerfassungsmethode sowie dem Verzicht auf den Fragebogen. In einem ähnlichen Rahmen hat sich die Teilnahme an der laufenden Studie (2005-2007) in allen Kantonen gestiegen. In 8 von den 9 Kantonen (AI, AG, BL, BS, NE, SH, SO, SZ, ZH) die im Jahr 2005 teilnahmen, ergab sich eine deutliche Erhöhung der Durchimpfung; einzig im Kanton Schwyz zeigte sich eine klare Reduktion. Ein deutlicher Anstieg der Durchimpfungsrate für alle Impfungen war auch bei den Schulkindern zu beobachten, dies könnte jedoch darauf zurückzuführen sein, dass eine andere Altersgruppe ausgewählt wurde.

Zusammenfassend kann man feststellen, dass der Impfgrad der Kinder in der Schweiz zwischen 1999 und 2005 zwar gestiegen, jedoch noch immer sub-optimal ist. Die Durchimpfung wird durch demographische und politische Faktoren, persönliche Einstellung gegenüber Impfung,

Einschätzung der Impfrisiken und Gefährlichkeit von Kinderkrankheiten, sowie der Verfügbarkeit von Informationen beeinflusst. Zukünftige Impfkampagnen sollten diese Faktoren in Betracht ziehen. Da ein möglichst hohes Impfniveau nötig ist um den Ausbruch von Krankheiten zu verhindern, wird empfohlen, dass die Impfraten der Kinder in der Schweiz regelmässig erhoben werden. Das laufende Erhebungsmodell sieht einen 3-Jahresrhythmus vor. Es sollten Strategien erarbeitet werden, um die grosse Bereitschaft der Kantone und Gemeinden an der Studie mitzumachen zu erhalten und die Antwortraten bei den ausgewählten Familien zu erhöhen.

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Abbreviations

Cantons	The 26 cantons in Switzerland are referred to by their official abbreviations in this report.
CAM	complementary / alternative medicine
CDC	Centers for Disease Control and Prevention
CI	Confidence interval (95%)
CMO	Chief Medical Officer, "Kantonsarzt". For each canton there is one CMO.
DTPPolHibMMR	Immunization series where D, T, P, Pol, Hib, MMR are analyzed together and the numbers represent the number of doses for each vaccine, respectively. For example, 33333111 indicates 3 doses of D, T, P, Pol, Hib and combined dose of MMR. Used in the evaluation for toddlers and children at school entry.
DTPPolMMR	Immunization series where D, T, P, Pol and MMR are analyzed together and the numbers represent the number of doses for each vaccine, respectively. For example, 5505111 indicates 5 doses of D, T, Pol, combined dose of MMR and 0 dose of Per. Used in the evaluation for children at school departure.
GSU	Grenzsanitarische Untersuchungen. They are responsible for health examinations and vaccinations for those seeking asylum in Switzerland. University of Zurich
LL	"Lungenliga". Non-profit organization responsible for health aspects associated with lungs and breathing problems.
MMWR	Morbidity Mortality Weekly Report
SD	Standard deviation
SFOPH	Swiss Federal Office of Public Health
SFSO	Swiss Federal Statistical Office
SKIF	Swiss Advisory Committee on Immunisation
UTD	Up to date
WHO	World Health Organization

Conditions for data analysis

Vaccination

	DTPPolHibMMR series				DTPPolMMR series	
Diphtheria (Di or D)	Toddlers		School entry		School departure	
Tetanus (Te or T)	w/out Per/Hib	with Per/Hib	w/out Per/Hib	with Per/Hib	without Per	with Per
Pertussis (Per or P)	33030111	33333111	33030111	33333111	3303111	3333111
Polio (Pol)	44040111	44443111	44040111	44443111	4403111	4433111
Haemophilus influenzae type B (Hib)			55050111	55553111	5505111	5535111
Measles			55050222	55553222	5505222	5535222
Mumps					6605111	6635111
Rubella					6605222	6635222
Hepatitis B (HepB)	because Hib was recommended just recently, it was not considered in the analysis for children at school departure.					

Categories	Cantons
Linguistic region	
German-speaking	AG, AI, AR, BE, BL, BS, GL, GR, LU, NW, OW, SG, SH, SO, SZ, TG, UR, ZG, ZH
French-speaking	FR, GE, JU, NE, VD, VS
Italian-speaking	TI
Participation	
Toddlers	**includes all cantons**
< 60%	AR, BS, FR, GR, JU, NE, LU, SG, SH, SO, TG, VS, ZG
60-70%	AR, BL, GL, NW, OW, SZ, UR, VD, ZH
> 70%	AI, BE, GE, TI
School entry	**does not include BE, JU, NE, TI**
< 60%	AR, GL, GR, LU, NW, OW, SG, SH, SO, TG, UR, VS, ZG
60-79%	AG, BL, FR, SZ
≥ 80%	AI, BS, GE, VD, ZH
School exit	**does not include BE, JU, NE, TI**
< 60%	BL, GR, LU, NW, OW, SG, SO, TG, ZG
60-79%	AI, AR, BS, FR, GL, SH, SZ, UR, ZH
≥ 80%	AG, GE, VD, VS
Data collection mode	**does not include BE, JU, NE, TI**
School doctors	AI, AR, GL, GR, SG, SH, UR, ZH
School / "Lungenliga" nurses	AG, BL, BS, GE, SZ, VD, VS
School officials	FR, LU, NW, OW, SO, TG, ZG
considering HepB campaign in the schools	
School doctors	AR, ZH
School / "Lungenliga" nurses	AG, BS, GE, SZ, VD, VS
School officials	FR, LU, SO, TG
no HepB campaign in the schools	AI, BL, GL, GR, NW, OW, SG, SH, UR, ZG
considering HepB vax in the schools	
School doctors	AR, GL, GR, SG, SH, ZH
School / "Lungenliga" nurses	AG, BL, BS, GE, VD, VS
School officials	FR, NW, TG
does not vax in the schools	AI, LU, OW, SO, SZ, UR, ZG
School vaccination policy	**does not include JU**
use cantonally employed school nurses or LungenLiga nurses:	
Yes	AG, BL, BS, GE, NW, SZ, VD, VS
No	AI, AR, BE, FR, GL, GR, LU, NE, OW, SG, SH, SO, TG, TI, UR, ZG, ZH
vaccination permitted in school	
Yes	AG, AR, BE, BS, FR, GL, GR, NE, NW, SG, SH, SZ, TG, VD, VS, ZH
No	AI, BL, GE, LU, OW, SO, TI, UR, ZG
HepB campaign in the schools	
Yes	AG, AR, BE, BS, GE, FR, LU, SO, SZ, TI, TG, VD, VS, ZH
No	AI, BL, GL, GR, NE, NW, OW, SG, SH, UR, ZG
HepB vax in the schools	
Yes	AG, AR, BE, BL, BS, FR, GE, GL, GR, NW, SG, SH, TG, VD, VS, ZH
No	AI, LU, NE, OW, SO, SZ, TI, UR, ZG

1. Introduction

Since its inception, vaccination has prevented millions of deaths and sufferings, and has been documented as one of the most cost-effective public health measures [Chabot et al, 2004; Ulmer and Liu, 2002; CDC / MMWR, 1999(a); CDC / MMWR, 1999(b); WHO website]. Based on statistics for the United States, annual morbidity due to childhood vaccine preventable diseases has decreased 99-100% since 1900 [CDC / MMWR, 1999(a)]. For measles alone, global summaries by the World Health Organization (WHO) revealed that in 1980, 3.9 million cases were registered worldwide; in 2002, only 586,000 cases. In the WHO designated European region, the number of measles reported cases decreased from 492,000 in 1980 to 46,700 cases in 2002 [WHO: Global summaries, 2003]. Measles is responsible for nearly half of the estimated 1.7 million annual deaths due to childhood vaccine preventable diseases in 2000, and is one of the leading causes of childhood mortality [Henao-Restrepo et al, 2003]. Moreover, an estimated 1 million measles deaths have been prevented by vaccination in 2000, when assuming the same measles case-fatality ratios in the pre-vaccine era as those currently observed in the presence of vaccination programs [Henao-Restrepo et al, 2003]. The Measles Initiative announced recently that death as a result of measles has been reduced by 60% worldwide between 1999 and 2005, from an estimated 870,000 to 345,000 [Editorial team, Euro Surveill, 2007; Wolfson et al, 2007].

However, measles remains an extremely contagious disease, with outbreaks still common in Europe. Because vaccine-preventable diseases have become less prevalent, much of the attention from both healthcare providers and parents in the western communities has been shifted from dangerous consequences of the infections to the rare side effects of the vaccines [Offit and Coffin, 2003; Owens, 2002; Tickner, 2006]. Despite numerous studies that have

proved otherwise, speculations that the MMR vaccine is linked to autism, encephalitis or aseptic meningitis have reduced MMR coverage about 8.6 percentage points in the United Kingdom, with some areas having coverage as low as 65% [Wakefield et al, 1998; Taylor et al, 1999; Kaye et al, 2001; Madsen et al, 2002; Mäkelä et al, 2002; Owens, 2002; Ramsey et al, 2002; Wilson et al., 2003; DeStefano et al, 2004; Geier and Geier, 2004; Smeeth et al, 2004; Demicheli et al, 2005; Elliman and Sengupta, 2005]. Additionally, concerns that vaccination may lead to atopy, asthma, or diabetes have also added fuel to the ongoing vaccination debate, although many large epidemiological studies have refuted this claim [Paunio et al, 2000; Grüber et al, 2002; Bager et al, 2003; Bernsen et al, 2003; Grüber et al, 2003; Nilsson et al, 2003; Stehr-Green et al, 2003; Hviid et al, 2004; Koppen et al, 2004; Maitra et al, 2004; McKeever et al, 2004; Rottem and Shoenfeld, 2004; Adler, 2005; Flöistrup et al, 2006]. Furthermore, mistrust in government agencies and medical professions regarding vaccination, along with increase doubts in vaccine efficacy and safety, have negatively impacted vaccination campaign efforts [Evans et al, 2001; Cotter et al, 2003; Raithatha et al, 2003; Salmon et al, 2005; Casiday et al, 2006; Cassell et al, 2006].

Thus, it is becoming increasingly more difficult to maintain vaccination coverage levels high enough to interrupt circulation of the wild virus in the population, resulting in potentially dangerous epidemic outbreaks. For example, local measles outbreaks have been common in the past decade in many European countries. In The Netherlands, 2 measles epidemics occurred, one in 1999/2000 and one in 2002. Between June 1999 and May 2000, a large outbreak of 3,292 reported measles cases, with 3 measles-related deaths. It occurred in a community, where 83% of the 94% unvaccinated kids were religiously exempted [van den Hof et al, 2002]. Likewise, in Ireland, 1,407 cases of measles were notified, of which 111 children were hospitalized, and a total of 3 deaths resulted between December 1999 and July 2000 [McBrien et al, 2003]. A large outbreak occurred in London between December 2001

and May 2002 where a total of 580 cases (confirmed and suspected) were reported. From the 70% of cases where vaccination history was available, 98% had no record of receiving any measles vaccine; the majority of confirmed cases lived in the more affluent area of London [Atkinson et al, 2005].

Two outbreaks plagued Italy within the last three years: one in 2002 where 1,571 cases were reported between January to July, affecting primarily unvaccinated school-aged children. Of the 1,543 cases where vaccination status was known, only 7% of the children were vaccinated. Subsequently, it has been shown that the number of cases reported is inversely proportional to the vaccination coverage of the afflicted areas [Ciofi degli Atti et al, 2002(a) and 2002(b)]. Exactly one year later, 1,217 cases were reported in Italy between January and May 2003. Again coverage estimates for measles were low in the affected regions: 71% in Abruzzo, 77% in Puglia, and 55% in Calabria [Ciofi degli Atti et al, 2003]. In Greece between September 2005 and February 2006, 171 measles cases were reported. Epidemiological data showed that the majority of cases occurred in children under 14 years of age (45% in 0-4 years), and of the 110 known vaccination status, 89% were not vaccinated while only 11% had a single dose of measles-containing vaccine [Georgakopoulou et al, 2006]. In Madrid, Spain, 59 cases of measles were notified during the first quarter of 2006. Of the 19 cases who should have been vaccinated (between 15 months and younger than 21 years of age), 14 were not vaccinated; all vaccinated patients were born in Spain, and the non-vaccinated ones were born in other countries or belonged to minority ethnic groups [Garcia-Comas, 2006].

In Germany, there were regional variations in measles incidence and outbreaks, with the largest outbreak in Bavaria between November 2001 to April 2002 where 1,166 measles cases were reported; many parents in this region did not support vaccinating their children against childhood diseases due to anthroposophical beliefs. A more detailed investigation into an

outbreak in Nordfriesland between January to April 2001 showed that of the 133 confirmed clinical cases, 93% had never been vaccinated against measles [Hellenbrand et al, 2003]. Local measles outbreaks were repeated in the federal states of Hess and Bavaria in 2005 [Siedler, 2006] and Nordrhein Westfalen [van Treeck, 2006] and Baden Württemberg in 2006 [Editorial team, Eurosurveill, 2006]. Of the 223 cases in Hess, 95% were unvaccinated, with the highest age-specific attack rate in children aged 1- 4 years, with clustering observed in families and households. In Bavaria 98% of the 279 cases where not vaccinated, with the highest age –specific attack rate in children aged 5-9 years, indicating a clustering in schools or pre-school facilities. Within the first half year of 2006, 1018 cases of measles were reported in Nordrhein Westfalen, where only 2.5% were fully vaccinated with 2 – doses against measles; schoolchildren were mainly affected. In Baden-Württemberg, all 58 cases reported during the first quarter of 2006 were not immunized; the patients belonged to a social group where measles vaccination is viewed as unnecessary.

Finally, in Switzerland, there were two large measles outbreaks, one in 1997 and one in 2003. Two hundred and thirty five cases were reported in 1997 within Sentinella (estimated number of cases for Switzerland: 6,400), of which 16% of the patients were vaccinated, compared to 30% in 1995, 32% in 1996 and 25% in 1998 [Paget et al, 2000]. In 2003, 614 cases were registered through the notification system, where 79% of the patients were under 16 years of age and 88% were not vaccinated against measles [Richard et al, 2003; Zimmermann, personal communication, 2004]. Between 2004 and 2006, there were two small local outbreaks of measles in cantons LU and VD, with many of the cases not vaccinated against measles [Masserey et al, 2006; Shang-Meier, 2007].

Concerned with potential epidemic outbreaks, the Swiss Federal Office of Public Health (SFOPH) sponsored a national effort between 1999-2003 to determine vaccination coverage levels in each of the 26 cantons. The survey has two major goals:

1. to determine vaccination coverage and factors affecting vaccination in three different age groups: toddlers 24-35 months of age, children at school entry and school departure, and
2. to establish a feasible methodology that could be implemented in every canton utilizing the existing infrastructure where possible.

As it took 5 years to complete the study in all 26 cantons, the survey was repeated in the canton of Valais (VS, subsequently all cantons will be abbreviated) in 2003, taking into consideration the many changes to improve the methodology to ensure better data quality. A section is used to describe the changes implemented and its overall effect on vaccination coverage and participation in the canton of VS.

A third section of this thesis will briefly summarize the ongoing Swiss National Vaccination Coverage Survey developed based on the results and experience from the survey 1999-2003. The current 3-year rolling cycle is an improvement of the previous methodology implementing many of the recommendations suggested by collaborators and results analysis to produce a sustainable surveillance system with outstanding and comparable data.

2. Methodology

2.1 Target population

As vaccination plays an important role in public health, a surveillance system to regularly monitor immunization coverage should be established. Three age groups were of interest: toddlers between 24-35 months of age (main target group), children at school entry and children at school departure. By the age of 2, children should be up to date with all the recommended infant and toddler vaccinations. If results indicate that immunization coverage for children at this age is low, then a program can be initiated to increase coverage before school entry in order to prevent disease outbreaks. Because vaccination behaviors of parents will change as children get older, it is important to continually monitor children's vaccination status. For examination of schoolchildren, the time of school entry is crucial, as well as the time of school departure, especially to determine Hepatitis B acceptance among the adolescents. If necessary, catch-up programs for children can also be implemented during these school years.

2.2 Study design

As it is important to have high coverage in all regions / cantons to effectively control or eliminate a disease, one of the major goals was to conduct the survey in every single canton. Due to limited resources and sampling frames, while hoping to gather support from the individual cantons, it was sought to adapt the survey to the existing infrastructure in each canton as much as possible. For the toddlers, a two stage sampling design with municipalities serving as the primary sampling units was employed (Levy and Lemeshow, 1999). Parents were contacted via two modes, mail and telephone. With the schoolchildren, random sampling of school classes with school classes serving as the primary sampling units was utilized.

Parents were only contacted via letters through the aid of teachers, school officials, school doctors or school nurses. In addition to submitting information on their child's immunization status (via a copy of the immunization card), parents were also requested to complete a structured close-ended questionnaire regarding vaccination, perception of selected diseases, information about vaccination, and use of alternative medicine (Annex Questionnaire).

The survey was repeated in canton VS in 2003 to determine the feasibility of the methodology with changes as recommended by the collaborators in canton VS to improve data quality. Although the basic methodology was still used, three major changes were implemented in 2003:

1) questionnaires were not utilized. Only vaccination status was examined, along with demographic variables such as gender and nationality. By the schoolchildren,

2) children in the second grade were recruited to participate instead of those in the first grade, and

3) vaccination summary forms were completed by the "Lungenliga" (LL) nurses.

2.3 Statistical considerations

Sample size calculation at 95% confidence interval and a precision of ±7% with a design effect of 2 due to sampling via clusters required a minimum of 400 samples. To take into account non-compliance of approximately 30-40%, a final sample size of 500- 600 per age group per canton was needed in this cross-sectional survey [Lemeshow et al, 1990].

2.4 Data collection

Data collection methods for toddlers and schoolchildren were distinctly different due to available sampling frames, but remained similar among the cantons.

2.4.1 Toddlers

For the toddlers, a list of the number of children born in a specified year in each municipality served as the sampling frame except for cantons AI, BS, NE, GE and VD where a single registry of all residents exists (Annex A). Supplied to ISPMZ by the Office of Statistics in the Canton of Zurich, this list is a compilation submitted by each canton to the Swiss Federal Statistical Office (SFSO) for the Statistical Yearbook for Switzerland [1999-2003]. By the time the list is used for the survey, the birth cohort is about 3 years old. Because of the tendency for families to remain at the same address for a relatively long period of time, the list remains fairly accurate. For BS and NE, simple random sampling was conducted to select the children. Due to their relatively small size, all children who were between 24-35 months of age and resided in cantons AI, GL, NW, OW and UR at the time of the study were recruited for the study. Because diphtheria vaccination is mandatory in GE, the Office of the Chief Medical Officer (CMO) regularly sends a letter requesting the immunization cards to all parents whose toddlers have reached the age of 28 months. Graciously, GE allowed ISPMZ to coordinate our study with this routine so as not to overburden the parents. In canton VD, sample selection was conducted by the "Bureau Vaudois d'Adresses" as they are responsible for maintaining the central registry for the canton.

By the remaining cantons, the sampling procedure varied statistically as we tried to simplify the sampling technique (please refer to the cantonal assessment submitted to each canton for details describing the survey as implemented in the canton). In brief, municipalities were first selected, and then the children in these municipalities (Annex B). These municipalities were then requested to provide information (names of child and parents, date of birth, gender, address, nationality, telephone number) of the selected children. Children and their families were then invited to participate per mail, which included an introductory letter, the

questionnaire in the language of the region, and if necessary another questionnaire based on their nationality, and a pre-paid return envelope. Three to four weeks later a reminder was sent to all those who still have not responded, followed by a final telephone attempt, which included 3-4 calls at different hours during the week. Reasons for not participating in the survey were recorded in most cantons. The questionnaire exists in 8 different languages: German, French, Italian, Turkish, Albanian, Serbo-Croatian, English, and Portuguese.

2.4.2 Schoolchildren

An exhaustive list of schools and the number of classes with children in the target population served as the sampling frame for the schoolchildren, except in NE. From this list, between 30 and 50 school classes were randomly chosen, depending on the average class size in the canton (Annex B). All children in these selected classes were recruited for the study. After the classes have been chosen, the data collection method diversified, depending on the existing infrastructure (Table 1). In cantons FR, LU, NW, OW, SO, TG and ZG, school directors and teachers were directly contacted to participate in the study. They were requested to distribute, collect and send the information (questionnaire and a copy of the vaccination card or the original) to ISPMZ. In AI, AR, GL, GR, SG, SH, TI, UR and ZH information were sent to the school doctors who coordinated the study with the routine school health exams. Because of their small size, all school doctors in cantons AI, GL and UR were requested to collect information from all classes at school entry and departure that were under their care. After collecting the questionnaires from the kids and either copying the vaccination booklets or completing a vaccination summary form (Annex Vaccination Summary Forms), all information were then sent to ISPMZ. When a school doctor refused to participate, the teachers or directors were directly contacted and the same procedure followed, as described above. In cantons AG, BL, BS, GE, JU, SZ, VD and VS the study was coordinated with the nurses in the school health services or the LL league who, like the aforementioned

collaborators, were responsible for all stages of data collection. Because the study was coordinated with the school health examinations, the selected grades varied- for school entry: children in kindergarten (second year), first, second or third grade were recruited, and by school departure, included were adolescents in the 6th, 7th, 8th or 9th grade. Finally, in cantons BE and NE, the method utilized for the toddlers were also used for the schoolchildren. Families were directly contacted to participate in the study.

Table 1. Data collection methods for schoolchildren

Method	Canton
Nurses	
School health services	BS, GE, VD, SZ
Lungenliga	AG, BL, JU, VS
School physicians	AI, AR, GL, GR, SG, SH, UR, TI, ZH
School directors/ teachers	FR, LU, NW, OW, SO, TG, ZG
Municipalities	BE, NE

BE, TI: The survey was conducted independent of ISPM.

As with the toddlers, each student in the selected classes received an envelope to bring home to their parents, which included an introductory letter and the questionnaire. The collected information was then returned to ISPMZ either via the school doctors, nurses, or school officials, with the original vaccination cards being returned within one week.

In cantons BE, SO, TG and TI all phases of data collection were organized and conducted by the Office of the CMO; cantons SO and TG collected the data after sampling was conducted by ISPMZ, whereby in cantons BE and TI, all steps were performed independent of ISPMZ [Maurer, 2003; Galfetti, personal communication, 2003]. Data were graciously shared to ISPMZ for data analysis.

In VS 2003, a revised vaccination summary form (Annex) was completed by the LL nurses for each class that was selected for the study. Children in the 2nd and 8th grades were recruited for the study. Regardless of whether or not they participated in the study, the nurses were

requested to include every single student in the class on the form. Data were collected between April and June 2003. Data entry and analysis were performed by ISPMZ.

2.5 Data analysis

Data for the toddlers and schoolchildren were weighted based on sampling probability, adjusted for nonresponse and poststratified by nationality (Swiss / non-Swiss), and sex. For toddlers, in addition to sex and nationality, urbanicity (city/ country, as defined by the SFSO) [1999-2003] was also used in poststratification so that totals matched estimates from the Statistical Yearbook with respect to the 3 aforementioned variables for generalization to the current population. Adjustment for nonresponse included distributing the weights of nonresponders to responders, under the assumption that the sample is representative of the general population and that behavior of those who do not respond will be similar to those who do respond. Imputation was conservatively done for missing information on gender and nationality for selected toddlers, where names were available. In the cantons of BE, VD and TI where the survey was independently conducted by the cantons themselves, questionnaires were not used with the schoolchildren. In addition to vaccination status, nationality and gender were also available for the children in the canton of BE, while only nationality was recorded for VD; for TI, only nonresponse adjustments were made since no other variables were collected.

Age distribution was examined only for children submitting information from the vaccination card. For the schoolchildren in canton BL, dates of births were extracted from the questionnaires since this information was not supplied on the vaccination summary forms. Because data collection lasted for several months, to determine the age of the children, the point at which the majority of data were collected was selected as the time of reply for that

particular canton and that specific age group. When it was not possible to estimate this period, the middle point of data collection was designated as the time of participation.

Only in cases where vaccination information were extracted from a vaccination card, descriptive Chi square analyses and logistic regression were conducted utilizing the statistical software Stata, Version 7.0 [2001]. Vaccination status and questionnaire were obtained for toddlers from all cantons; for the schoolchildren, vaccination information is missing from canton JU and questionnaires are missing from cantons BE, TI and VD. Due to misunderstandings in canton JU, immunization coverage by doses for the individual vaccines were not determined, although questionnaires were collected.

For data analysis, "up to date" (UTD) with the recommended childhood vaccination schedule was defined according to the 3 age groups at different number of doses for diphtheria (Di or D), tetanus (Te or T), pertussis (Per or P), poliomyelitis (Pol), *Haemophilus influenzae* type B (Hib), measles, mumps, rubella (MMR), and at the DTPPolHibMMR immunization series for toddlers and children at school entry and DTPPolMMR series for children at school departure. For toddlers, the DTPPolHibMMR immunization series was either 33333111 (i.e. 3 doses of D, T, P, Pol and Hib and combined dose of measles (M), mumps (M), and rubella (R)), or 44443111, or without Per and Hib at 33030111 or 44040111; for children at school entry, it was held at 33333111, 44443111, 55553111 and 55553222, and without Per and Hib at 33030111, 44040111, 55050111 and 55050222; and for children at school departure, we compared coverage at various DTPPolMMR vaccination series, with and without 3 doses of Per. Hib was not analyzed for the children at school departure as it was only introduced into the vaccination plan recommended by the SFOPH and the Swiss Advisory Board on Immunisation (SKIF) in 1991. The DTPPolMMR series without Per included 3303111, 4404111, 5505111, 5505222, 6605111 and 6605222; with Per, they were 3333111, 4434111,

5535111, 5535222, 6635111 and 6635222 (see list of Abbreivations). Hepatitis B (HepB) was analyzed only for children at school departure as it is recommended by the SFOPH for children between 11-15 years of age.

Independent variables for the univariate logistic regression model included: demographic factors (nationality (Swiss vs. non-Swiss), sex (male vs. female), number of siblings (0 vs. ≥ 1), number of older siblings (0 vs. ≥ 1), number of younger siblings (0 vs. ≥ 1), and highest educational level of the mother (low vs. middle vs. high), language of the region (German vs. French vs. Italian), alternative medicine use (no vs. yes), receipt of information regarding vaccination (no vs. yes), satisfaction with the available information (no vs. yes), response rate (toddlers: < 60% vs. 60-70% vs. > 70%; schoolchildren: < 60% vs. 60-79% vs. ≥ 80%), parental perception of the dangers of childhood vaccine-preventable diseases, and parental attitudes toward immunization in general. Mode of data collection and school vaccination policy also served as independent variables for the schoolchildren. Dependent variables for the toddlers were coverage estimates for DTPPolHibMMR at series 3333111, Di at 3 doses, Hib at 3 doses and measles at one dose; for children at school entry, the dependent variables were coverage estimates for DTPPolHibMMR at series 44443111, Di at 4 doses, Hib at 3 doses and measles at one dose; and by the children at school departure, the dependent variables were coverage estimates for DTPPolMMR at series 5505111, Di at 5 doses, Pol at 5 doses and measles at one dose. Hib was not considered in the analysis for the school departure, as it was only recently recommended; many of the teenagers would not have been vaccinated for it. Significance was held at p-value less than 0.05, unless otherwise specified.

Nationality was also examined in further detail, as collected in the questionnaire. Children of foreign background were further categorized into 4 regions: Europe (countries in the European Union and Norway); Eastern Europe, including Turkey; Asia; and others. As canton

VD did not use identical nationality groupings in the vaccination summary form as those in our survey, schoolchildren from canton VD were not included in this analysis. Because geographical location of some European countries may also influence vaccination coverage as determined by Bouvier et al in 1994, countries of origin were also regrouped into 7 regions: northern and western Europe (countries in the European Union and Norway), minus those categorized as Southern Europe; Eastern Europe, including Turkey; Southern Europe, which includes Portugal, Italy, France, Spain, and Greece; Asia; Latin and South American; Africa; North America, New Zealand and Australia. This latter re-grouping was only done for the toddlers, when the information was available; it did not include cantons BE, TI and TG.

Educational level was partitioned into categories very similar to those from the Statistical Yearbook, as defined by the SFSO [2003]. The categories included: none (no formal education), first 9 years of schooling (obligatorische Schule), basic vocational training / Apprenticeship (Berufsschule / Berufslehre), high school diploma / teaching training (Maturitätsschule / Lehrerseminar), higher non-university diploma (Höhere Berufsausbildung), university (Universität / Hochschule), and others. Parents who provided a description as to their educational background when ”others” was checked, were re-grouped into one of the aforementioned categories when possible.

The list of conditions for analysis found on pages ix-x summarizes the different categories used in the analysis and the subdivision of cantons within these variables. Cantons designated as French-speaking are FR, GE, JU, NE, VD and VS; the German-speaking region includes cantons AG, AI, AR, BE, BL, BS, GL, GR, LU, NW, OW, SG, SH, SO, SZ, TG, UR, ZG and ZH; TI is the only Italian-speaking canton. For the logistic regression, response rates were divided into 3 groups: low, where participation was below 60%; medium, where participation was between 60-70% for toddlers and 60-79% for schoolchildren; and high, where

participation was more than 70% for toddlers and 80% or more for schoolchildren. For the toddlers, cantons falling into the group with low participation included AR, BS, FR, GR, JU, NE, LU, SG, SH, SO, TG, VS, ZG; medium included cantons AR, BL, GL, NW, OW, SZ, UR, VD, ZH; and high included 4 cantons AI, BE, GE, TI. For school entry, cantons with low participation included AR, GL, GR, LU, NW, OW, SG, SH, SO, TG, UR, VS and ZG; at the middle level are cantons AG, BL, FR and SZ; and those with high participation included cantons AI, BS, GE, VD and ZH. For school departure, cantons falling into the low participation group included BL, GR, LU, NW, OW, SG, SO, TG and ZG; at the middle level are cantons AI, AR, BS, FR, GL, SH, SZ, UR and ZH; and those with high participation are cantons AG, GE, VD and VS. The influence of the mode of data collection on vaccination coverage was also examined for schoolchildren where the methods used were similar for the 2 age groups and did not include cantons BE, NE, JU and TI. Cantons where collaboration with school doctors were sought included AI, AR, GL, GR, SG, SH, UR, TI, and ZH; collaboration with cantonal employed school / LL nurses supplementing the school health services (thereafter referred to as school / LL nurses) included cantons AG, BL, BS, GE, SZ, VS and VD; and collaboration with school authorities included cantons FR, LU, NW, OW, SO, TG and ZG. Before this analysis could be done for HepB, the cantons were first categorized by their HepB vaccination policy (yes, vaccinate for HepB vs. no) or existence of a HepB campaign (yes vs. no) in the schools and then further subdivided into the different modes of data collection. A HepB campaign is defined as one where additional HepB information was shared to supplement the standard disease / vaccination information given to the parents before the routine school health examinations. The final subsets for data collection method, in regards to HepB vaccination policy, are cantons where collaboration with school doctors were sought included AR, GL, GR, SG, SH and ZH; with school / LL nurses included cantons AG, BL, BS, GE, VS and VD; and with school authorities included cantons FR, NW, and TG. Cantons AI, LU, OW, SO, SZ, UR and ZG did not vaccinate against HepB during school

hours while cantons AI, BL, GL, GR, NW, OW, SG, SH, UR and ZG did not organize an official HepB campaign in the schools. In AR and ZH, HepB campaigns were conducted in the schools and help was sought from the school doctors; in cantons AG, BS, GE, SZ, VD and VS, school / LL nurses collected the data; and those where collaboration with school officials were requested included cantons FR, LU, SO and TG.

Finally, immunization coverage levels for schoolchildren were further investigated by categorizing the cantons into those who do and do not vaccinate within the school health service, and those with and without school / LL nurses to supplement the school health services. Cantons who vaccinate in the schools (not considering HepB) include AG, AR, BE, BS, FR, GL, GR, JU, NE, NW, SG, SH, SZ, TG, VD, VS, and ZH; those who do not vaccinate in the school are AI, BL, GE, LU, OW, SO, TI, UR and ZG. Cantons AG, BL, BS, GE, JU, NW, SZ, VD and VS supplement their school health services with school / LL nurses; those without this additional help include cantons AI, AR, BE, FR, GL, GR, LU, NE, OW, SG, SH, SO, TG, TI, UR, ZG and ZH. As described earlier in the analysis of data collection modes in regard to HepB campaign and vaccination policy in the schools, the grouping of cantons within these two categories remain the same, but now also includes BE, NE and TI. HepB campaigns were also conducted in cantons BE and TI and not NE; HepB vaccination may be administered in the schools in BE, but not in NE and TI.

Data analysis for VS 2003 is similar to those done for the cantons in 1999-2003. Additional information recorded includes reasons for nonresponse for schoolchildren, which were collected on the vaccination summary forms.

3. Results

3.1 Participation

Between 1999 and 2003, we have completed the study for all 3 age groups in every single canton. Cantons participating in 1999 were VS and ZH, as part of the pilot study; throughout 2000 to 2002, the remaining 24 cantons participated, averaging about 8 cantons per year [Annex C]. In 2003, data collection was completed for canton VD and the study was once more repeated in canton VS, but without the additional questionnaire. Cantons BE and TI conducted the survey in 2001 and 2002, respectively, and shared the data with ISPMZ for analysis. Support for this study was given by all CMO, except from cantons OW and ZG. However, a former president of the pediatric society in canton ZG co-signed the letters sent to the parents in the name of all pediatricians in ZG. Most cantons helped in some way during data collection, particularly with the schoolchildren, by contributing financial and/ or personnel resources and written support such as letters to the parents, municipalities, educational departments or offices of data protection. Cantons TG and SO were alone responsible for the entire data collection process after ISPMZ performed the sampling; TI and BE conducted the entire survey independently from ISPMZ, but utilized similar data collection method for comparability purposes. In TI, all children were recruited through the schools, whereas in BE the municipalities were used and parents were directly contacted by the Office of CMO.

3.1.1 Toddlers

For 25 cantons, toddlers between 24-35 months of age were selected, except in TI where data was collected from children in the first year of kindergarten. Participation by the individual municipalities was high at a mean of 97.1%, with a low of 89% in cantons TG and FR (Table 2). These two cantons have many municipalities which, although politically integrated, were indicated as separate entities on our sampling frame lists; consequently, some municipalities completed the

requested information without incorporating the requests directed to the other municipalities included in their district.

Examination of the age distribution of toddlers at the time when a vaccination card was submitted revealed that the age ranged between 25.5 and 81.3 months, with the mean at 34.7 months of age (standard deviation (SD) ±5.30), where 63.9% were between 25 and 35 months of age (data not shown). When excluding toddlers from the canton of TI, the age distribution was between 25.5 and 42.4 months, 33.7 (SD ± 3.6), and 69.2%, respectively.

As indicated in Table 2, response rates from families of toddlers who submitted both vaccination cards and questionnaires ranged from a low of 41.9% in TG to a high of 79.6% in AI with an overall mean of 59.9%. Inclusion of information from vaccination cards based solely on parental recalls can increase the participation to as high as 80% (data not shown). Response rates were also increased at all 3 times of contact with the parents, with the first letter being most effective (25.7%), followed by the telephone call (15.0%), and finally the recall letter (13.7%).

Table 2. Participation by the municipalities and the parents of toddlers, 1999-2003

Canton	Municipalities selected (n)	Municipalities participated(%)	Letters sent (n)	Response (%)	Time of response (%) 1st letter	Time of response (%) Recall	Time of response (%) Telephone	Response (%) VC+Q	Response (%) VC	Response (%) Q
AG	63	96.8	572	64.2	19.1	9.4	35.7	56.1	56.1	64.2
AI	-	-	230	80.4	31.7	21.7	27.0	79.6	80.4	80.4
AR	20	100.0	399	72.9	28.8	19.5	24.6	67.2	67.7	72.9
BE	60	100.0	567	81.1	49.4	21.9	9.9	81.1	81.1	81.1
BL	58	98.3	542	68.5	42.3	5.7	20.5	62.2	62.2	68.5
BS	-	-	600	55.5	27.8	11.5	16.2	47.8	48.5	54.8
FR	63	88.9	553	65.8	31.3	12.5	21.7	50.6	50.8	65.5
GE	-	-	848	84.7	-	-	-	69.0	82.8	70.9
GL	29	100.0	416	76.4	44.5	15.1	16.1	64.4	65.4	75.5
GR	57	100.0	472	70.3	28.0	19.3	22.7	58.5	58.9	69.9
JU	50	96.0	418	74.2	26.3	20.6	27.3	55.7	56.7	73.2
LU	60	98.3	630	65.1	35.9	14.1	15.1	55.9	56.5	65.1
NE	-	-	603	65.8	18.6	17.7	29.5	55.2	55.6	65.5
NW	11	100.0	426	78.4	43.0	18.8	16.2	69.0	69.5	77.9
OW	7	100.0	384	71.6	23.7	23.2	23.7	61.5	62.5	70.6
SG	60	100.0	496	61.7	28.0	16.3	16.5	55.2	56.0	60.9
SH	34	100.0	621	70.0	40.7	14.8	14.2	58.5	58.8	69.7
SO	62	100.0	552	56.2	-	-	-	53.1	53.4	55.8
SZ	30	100.0	586	73.4	41.8	14.2	17.2	65.5	66.0	72.9
TG	59	89.8	559	43.5	-	-	-	41.9	42.0	43.3
TI	48	95.8	930	75.5	-	-	-	57.2	73.5	59.1
UR	20	100.0	414	80.4	46.6	18.1	15.7	69.8	69.8	80.4
VD	-	-	600	69.8	27.5	24.0	17.3	60.5	63.7	66.7
VS	61	98.4	604	59.4	28.8	30.3	0.3	58.3	58.4	59.3
ZG	11	100.0	448	62.7	26.8	19.4	16.3	56.9	56.9	62.5
ZH	57	100.0	547	63.6	23.9	17.2	22.5	63.1	63.1	63.6
CH	**920**	**97.1**	**14017**	**68.7**	**25.7**	**13.7**	**15.0**	**59.9**	**62.3**	**66.4**

AI, BS, NE, VD: as a central registry of all kids residing in the canton exists, it was not necessary to write to the individual municipalities.
BE, GE, SO, TG, TI: data collected by the cantons, and shared with ISPMZ.
SO, TG: one of the first cantons to participate. Hence, limited records of the nature of the responses and completeness of info.
TI: data collected via school doctors, school districts and school classes for children in first year of kindergarten.
GE: data collected from all children 28 months of age, for 2 months. BE: 2 additional recall letters instead of telephone contact.
GE, SO, TG, TI: time of response is not known; hence total (%) time of response is only 54.4%, and not 68.7%.

Language barrier (15.9%) was the most prominent reason for nonresponse once contact was made, while not being able to reach the families by telephone (30.5%) and not locating the telephone numbers (28.9%) were major hindrances to the response rate (Table 3). Very few parents expressed strong feelings against vaccination as a reason for nonresponse (included in ”others”), whereas many clearly stated that they simply did not want to participate in a survey.

Table 3. Reasons for nonresponse (%) from parents of toddlers, 1999-2003

Canton	language barrier	Telephone nr. not found	not reached	moved	does not want to	no time	no interest	wrong child	others	Total (n)
AG	23.4	23.4	38.5	2.4	5.9	3.9	2.0	0.5	0	205
AI	4.5	11.4	22.7	9.1	9.1	15.9	11.4	6.8	6.8	44
AR	18.1	30.5	16.2	5.7	11.4	11.4	4	0.0	2.9	105
BE	-	-	-	-	-	-	-	-	-	107
BL	15.9	0	68.2	1.8	5.3	3.5	1.8	0	3.5	170
BS	25.3	42.4	16.0	6.3	4.1	1.5	0.7	1.1	1.1	269
FR	9.4	22.0	39.8	4.7	5.8	8.9	2.6	1.0	1.6	191
GE	-	-	-	-	-	-	-	-	-	130
GL	23.3	26.2	16.5	6.8	15.5	5.8	1.0	0	0.0	103
GR	22.9	35.8	43.1	11.0	4.6	7.3	3.7	0.0	0.9	109
JU	6.7	47.2	29.2	7.9	2.2	14.6	11	0.0	1.1	89
LU	15.4	23.1	34.8	10.0	7.2	4.1	0.9	0.9	1.8	221
NE	9.7	42.7	18.4	6.3	3.4	6.8	5.3	3.4	2.9	206
NW	7.1	36.5	38.8	5.9	5.9	14.1	0	0	0	85
OW	18.7	26.7	50.7	9.3	0.0	21.3	16	1.3	1.3	75
SG	28.3	29.9	18.7	4.3	6.4	10.2	1.6	0.5	0.0	187
SH	20.2	31.9	28.7	3.7	6.4	3.2	1.6	0	0.5	188
SO	-	-	-	1.0	-	-	-	-	-	1
SZ	19.7	28.7	22.9	3.8	7.0	6.4	0	1.3	0.0	157
TG	-	-	-	-	-	-	-	7.0	-	7
TI	-	-	-	-	-	-	-	-	-	228
UR	11.1	23.5	37.0	12.3	6.2	1.2	4.9	0	0.0	81
VD	3.1	33.8	13.3	1.5	25.1	7.2	1.0	4	3.1	195
VS	-	-	-	-	-	-	-	-	-	245
ZG	19.3	32.9	25.5	4.3	5.0	9.3	1.2	0.0	2.5	100
ZH	-	-	-	-	-	-	-	-	-	199
CH	**15.9**	**28.9**	**30.5**	**6.2**	**7.2**	**8.2**	**3.7**	**1.4**	**1.6**	**3697**

Table 3.1 compares demographic characteristics between responders and nonresponders. Although sex and language spoken in the region remain similar between these two groups, nationality and urbanicity are significantly different, where Swiss tended to participate more than foreigners and those from the urban regions, more than those from rural areas. Furthermore, a logistic regression of the response rates with vaccination coverage levels at 3 doses of Di and Hib and one dose of measles did not show any differences (data not shown); however, children residing in cantons that achieved response rates of more than 70% have a higher chance of being up to date (UTD) at the 33333111 DTPPolHibMMR series and at 4 doses of Di, Hib, and Pol than those where response

rates were lower than 60%, with the odds at 1.37 (confidence interval (CI): 1.09, 1.71), 1.31 (CI: 1.02, 1.67), 1.27 (CI: 1.03, 1.57) and 1.54 (CI: 1.22, 1.94), respectively (Table 3.2).

Table 3.1. Comparison between responders and nonresponders of families with children aged 24-35 months for the survey without adjustments, 1999-2003

Categories	Responders N	%	Nonresponders n	%
Language regions				
German-speaking	5512	71.4	2835	77.6
French-speaking	2203	28.6	819	22.4
Nationality				
Swiss	6397	82.9	1861	55.8
Foreigners	1318	17.1	1477	44.2
Urbanicity				
City	3508	50.1	1451	41.2
Land	3489	49.9	2073	58.8
Gender				
Male	3712	48.1	1557	47.3
Female	4003	51.9	1735	52.7

BE, TI, VS, ZH: not included since info on nonresponders were not collected. TG: no info on nationality and gender. GE: no info on urbanicity.

Table 3.2. Logistic regression of response rate and vaccination coverage for DTPPolHibMMR for the number of doses at series 33333111, diphtheria at 4 doses, *Haemophilus influenzae* type B (Hib) at 4 doses, and polio at 4 doses for children 24-35 months of age living in Switzerland, 1999-2003

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)
participation	< 60%	3880	45.1	76.0 (73.9, 78.1)	ref	83.0 (81.4, 84.7)	ref
	60-70%	2818	34.0	78.7 (76.1, 81.2)	1.16 (0.96, 1.41)	82.6 (79.7, 85.6)	0.97 (0.77, 1.23)
	> 70%	2031	21.0	81.2 (78.3, 84.1)	**1.37 (1.09, 1.71)**	86.5 (84.0, 90.0)	**1.31 (1.02, 1.67)**

variable		n	%	Coverage for Hib (4 doses) %(±95%CI)	Odds Ratio Hib (4 doses) (±95%CI)	Coverage Pol (4 doses) %(±95%CI)	Odds Ratio Pol(4 doses) (±95%CI)
participation	< 60%	3880	45.1	78.6 (76.7, 80.4)	ref	81.6 (79.8, 83.4)	ref
	60-70%	2818	34.0	78.3 (75.1, 81.5)	0.98 (0.79, 1.22)	81.3 (78.1, 84.4)	0.98 (0.77, 1.24)
	> 70%	2031	21.0	83.3 (79.7, 85.0)	**1.27 (1.03, 1.57)**	87.2 (85.0, 89.4)	**1.54 (1.22, 1.94)**

CI: confidence interval. ref: reference group

3.1.2 Schoolchildren

Participation by the schoolchildren varied dramatically, depending on the method of data collection (via school directors, teachers, school doctors, or school health officials (Table 4, Annex D)). In cantons where cantonal employed school nurses or school health services supplement the school doctors at health examinations, participation rate was clearly better, ranging between 61.3% and 98.4%, with the mean being at 84.8% for children at school entry and 84.4% for those at school departure. When working with school doctors, the response rate decreased about 20% with the mean being 60.9% at school entry and 67.2% at school departure. Another 20-25% drop was seen when we worked only with the school officials and teachers to reach the parents. On the other hand, the response rates in NE where families of schoolchildren were directly contacted without aid from the school doctors or officials were mediocre at 69.6% for school entry and 63.5% at school departure; in BE participation was high at 89.5% and 90.6%, respectively, after 4 contacts per mail [Maurer, 2003]. Through the help of school doctors, response rates for the canton of TI were also high at 84.2% and 83.7%, respectively (Annex D.4) [Galfetti, personal communication, 2003] .

Table 4. Participation by schoolchildren during school years 1999-2003, in collaboration with cantonal employed school nurses, school doctors or school authorities.

School entry	Total School nurses		Total School doctors		Total School authorities	
	n	%	n	%	n	%
Number of classes	283		260		265	
Number of students	4173		4280		4725	
Number of participating classes	268	94.7	204	78.5	153	57.7
Number of vaccination cards	3303	79.2	2423	56.6	1754	37.1
Number of questionnaires	2547	61.0	2366	55.3	1905	40.3
Total response (VC or Q):	3540	84.8	2607	60.9	1915	40.5
Total nonresponse:	633	15.2	1673	39.1	2810	59.5

School departure	School nurses		School doctors		School authorities	
	n	%	n	%	n	%
Number of classes	243		252		248	
Number of students	4476		4056		4714	
Number of participating classes	234	96.3	189	75.0	111	44.8
Number of vaccination cards	3489	77.9	2558	63.1	1576	33.4
Number of questionnaires	2425	54.2	2084	51.4	1694	35.9
Total response (VC or Q):	3779	84.4	2724	67.2	1705	36.2
Total nonresponse:	697	15.6	1332	32.8	3009	63.8

Collaboration in cantons with school nurses: AG, BL, BS, GE, SZ, VD, VS
Collaboration in cantons with school doctors: AI, AR, GL, GR, SG, SH, UR, ZH
Collaboration in cantons with school authorities: FR, LU, NW, OW, SO, TG, ZG
BE, JU, NE, TI: not included.

The age distribution of the children at school entry submitting information from the vaccination card ranged between 4.5 and 12.5 years, with the mean being 7.3 (SD±1.12) years, where 91.2% were between ages 4 and 8. For those at school departure, the age ranged between 9.6 and 18.8 years, with the mean being 15.0 (SD±1.06) years, where 96.7% were between ages 12 and 16 (data not shown).

The influence of the participation level and method of data collection (via school doctors, school/ “Lungenliga” (LL) nurses or school authorities) was also examined, in which cantons BE, NE, TI and JU were excluded as parents in cantons BE and NE were directly contacted instead of via schools, the canton TI constructed its own sampling frame and conducted data collection independently from ISPMZ, and coverage estimates were not able to be assessed for canton JU. In Table 4.1.1, it can be seen that response rates, as well as the method of data collection, for children at school entry do not generally correlate with vaccination coverage, except for being UTD at 3 doses

of Hib and at the 44443111 series. Children residing in cantons where participation was between 60-79% have an odds of being UTD for 3 doses of Hib of 0.65 (CI: 0.52, 0.80) times that of those residing in cantons where participation was below 60%; for those residing in cantons where participation was 80% or more, the odds is 0.57 (CI: 0.47, 0.69) times that of those where participation was less than 60%. Children residing in cantons where school / LL nurses collected the data have an odds of being UTD at the 44443111 DTPPolHibMMR series of 1.68 (CI: 1.40, 2.01) times that of those residing in cantons where data were collected by the school doctors. In contrast, children residing in cantons where school officials were sought to help with data collection have an odds of 0.65 (CI: 0.53, 0.79) times that of those residing in cantons where data were collected by the school doctors.

Table 4.1.1. Logistic regression of response rates and data collection method and vaccination coverage for DTPPolHibMMR for the number of doses at series 44443111, diphtheria at 4 doses, *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children at entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)	
participation	< 60%	3418	40.8	48.8 (45.9, 51.6)		ref	91.8 (90.6, 93.1)		ref
	60-79%	1713	22.4	50.9 (47.1, 54.6)	1.09	(0.90, 1.31)	92.0 (90.2. 93.8)	1.03	(0.76, 1.39)
	≥ 80%	2337	36.7	48.5 (45.3, 51.8)	0.99	(0.83, 1.18)	92.9 (91.3, 94.4)	1.16	(0.87, 1.55)
data collection method	school doctors	2410	32.4	46.5 (43.1, 50.0)		ref	92.6 (90.7, 94.4)		ref
	school nurses	3304	41.8	59.3 (56.5, 62.2)	**1.68**	**(1.40, 2.01)**	92.4 (91.3, 93.5)	0.98	(0.72, 1.34)
	school officials	1754	25.8	36.1 (32.9, 39.2)	**0.65**	**(0.53, 0.79)**	91.6 (89.9, 93.3)	0.87	(0.62, 1.24)

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
participation	< 60%	3418	40.8	83.8 (82.2, 85.4)		ref	88.7 (87.4, 90.0)		ref
	60-79%	1713	22.4	76.9 (73.9, 80.0)	**0.65**	**(0.52, 0.80)**	87.2 (84.7, 89.8)	0.87	(0.67, 1.14)
	≥ 80%	2337	36.7	74.7 (71.8, 77.5)	**0.57**	**(0.47, 0.69)**	90.6 (88.8, 92.3)	1.23	(0.96, 1.57)
data collection method	school doctors	2410	32.4	77.2 (74.2, 80.2)		ref	89.0 (86.9, 91.0)		ref
	school nurses	3304	41.8	79.6 (77.8, 81.3)	1.15	(0.94, 1.41)	90.1 (88.8, 91.4)	1.12	(0.87, 1.46)
	school officials	1754	25.8	80.0 (77.2, 82.8)	1.18	(0.93, 1.50)	87.4 (85.3, 89.5)	0.86	(0.65, 1.14)

CI: confidence interval. ref: reference group. BE, JU, NE, TI: not included in analysis.

For children at school departure, Table 4.1.2 revealed that the method of data collection is more associated with vaccination coverage than the response rate. For adolescents residing in cantons where participation reached 80% or more, the odds of being UTD for 5 doses of Pol is 1.69 (CI: 1.33, 2.16) times that of those residing in cantons where participation was below 60%. Data collection method is highly correlated with being UTD at the 5505111 DTPPolMMR series and 5 doses of Di and Pol where adolescents residing in cantons in which the help of school / LL nurses was sought have an odds of 1.38 (CI: 1.10, 1.72), 1.36 (CI: 1.04, 1.77) and 1.76 (CI: 1.36, 2.27), respectively, times that of those residing in cantons in which school doctors aided in data collection.

By HepB, there are significant associations between coverage estimate and participation and mode of data collection (Table 4.1.2.1). Adolescents residing in cantons where participation ranged between 60 and 79% had a significantly lower chance of being UTD (odds ratio: 0.54, CI: 0.38, 0.76) at 1 dose of HepB than those living in cantons where participation in the study was less than 60%. Teenagers living in cantons in which doctors aided in data collection and where there were either HepB campaigns implemented or HepB vaccination permitted in the schools have a lower chance of being UTD for 1 dose and 3 doses of HepB than those residing in cantons where there were neither HepB campaigns nor were HepB vaccination permitted in the schools. In contrary, adolescents residing in cantons where data collection were conducted by the school or LL nurses and school authorities have a higher chance (odds ratio: 2.16 (CI: 1.60, 2.91) and 2.01 (CI: 1.31, 3.09), respectively), of being UTD at 1 dose of HepB when considering whether or not HepB vaccination is permitted in the schools.

Table 4.1.2. Logistic regression of response rates and data collection method and vaccination coverage for DTPPolMMR for the number of doses at series 5505111, diphtheria at 5 doses, polio at 5 doses and measles at 1 dose for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio 5505111 (±95%CI)		Coverage Di (5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)	
participation	< 60%	2196	32.0	72.6 (69.8, 75.4)		ref	80.5 (77.8, 83.3)		ref
	60-79%	3224	33.4	69.1 (65.1, 73.2)	0.85	(0.67, 1.07)	78.9 (75.2, 82.6)	0.91	(0.68, 1.20)
	≥ 80%	2203	34.6	75.8 (73.4, 78.2)	1.19	(0.98, 1.44)	83.1 (80.8, 85.3)	1.18	(0.94, 1.50)
data collection	school doctors	2558	35.2	69.6 (65.5, 73.7)		ref	78.4 (74.6, 82.3)		ref
method	school nurses	3490	42.9	75.9 (73.9, 77.9)	**1.38**	**(1.10, 1.72)**	83.1 (81.2, 85.1)	**1.36**	**(1.04, 1.77)**
	school officials	1575	22.0	70.7 (67.5, 73.8)	1.05	(0.83, 1.35)	80.4 (77.5, 83.2)	1.13	(0.84, 1.50)

variable		n	%	Coverage for Pol (5 doses) (±95%CI)	Odds Ratio Pol (5 doses) %(±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
participation	< 60%	2196	32.0	78.1 (75.2, 81.1)		ref	95.1 (94.0, 96.3)		ref
	60-79%	3224	33.4	75.4 (71.5, 79.2)	0.86	(0.65, 1.12)	93.8 (92.6, 95.1)	0.78	(0.56, 1.08)
	≥ 80%	2203	34.6	85.8 (83.7, 87.9)	**1.69**	**(1.33, 2.16)**	94.3 (93.3, 95,3)	0.84	(0.62, 1.15)
data collection	school doctors	2558	35.2	75.9 (72.0, 79.9)		ref	94.5 (93.3, 95.8)		ref
method	school nurses	3490	42.9	84.7 (82.9, 86.5)	**1.76**	**(1.36, 2.27)**	94.5 (93.6, 95.3)	0.99	(0.73, 1.33)
	school officials	1575	22.0	76.7 (73.4, 80.0)	1.05	(0.79, 1.39)	94.1 (92.8, 95.5)	0.93	(0.66, 1.31)

CI: confidence interval. ref: reference group. BE, JU, NE, TI: not included in analysis.

Table 4.1.2.1 Logistic regression of response rates and data collection method and vaccination coverage for Hepatitis B (HepB) at one dose and three doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverages for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverages for HepB (3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
participation	< 60%	2196	32.0	48.6 (42.4, 54.8)		ref	26.8 (22.2, 31.3)		ref
	60-79%	3224	33.4	33.7 (28.6, 38.9)	**0.54**	**(0.38, 0.76)**	21.4 (17.6, 25.3)	0.75	(0.54, 1.03)
	≥ 80%	2203	34.6	55.2 (50.0, 60.4)	1.30	(0.94, 1.81)	22.0 (18.1, 25.8)	0.77	(0.56, 1.06)
data collection	no HepB campaign	2353	20.9	54.0 (46.1, 61.9)		ref	23.2 (17.6, 28.7)		ref
method	school doctors	761	20.4	21.1 (13.7, 28.6)	**0.23**	**(0.13, 0.40)**	7.3 (2.3, 12.2)	**0.26**	**(0.12, 0.57)**
	school nurses	3143	39.7	53.2 (48.6, 57.8)	0.97	(0.67, 1.40)	23.7 (20.2, 27.1)	1.03	(0.72, 1.48)
	school officials	1366	19.0	48.7 (42.3, 55.0)	0.81	(0.54, 1.21)	40.0 (34.5, 45.4)	**2.21**	**(1.51, 3.25)**
data collection	no HepB vaccination	1620	15.9	37.9 (32.4, 43.4)		ref	31.3 (26.4, 36.2)		ref
method	school doctors	2128	34.1	34.2 (27.5, 41.0)	0.85	(0.58, 1.25)	12.2 (7.9, 16.5)	**0.31**	**(0.19, 0.49)**
	school nurses	3049	40.3	56.8 (52.3, 61.4)	**2.16**	**(1.60, 2.91)**	25.4 (22.0, 28.9)	0.75	(0.56, 1.00)
	school officials	826	9.8	55.1 (46.2, 64.0)	**2.01**	**(1.31, 3.09)**	40.2 (32.9, 47.6)	1.48	(1.01, 2.16)

CI: confidence interval. ref: reference group. BE, JU, NE, TI: not included in analysis.

3.2 Demographic comparison of participants in the survey

Table 5 displays demographic comparison of the children participating in the survey with the data from the SFSO, with and without weighting, nonresponse adjustments and poststratification. As it can be seen by the toddlers, where no adjustments and weights were made, participants were similar to the demographic statistics provided by the SFSO only in terms of gender. By nationality and urbanicity, the differences were very apparent. After the application of sampling weights, nonresponse adjustments and poststratification, the distribution of the demographic variables were much more similar to those from the SFSO. By the schoolchildren the difference in demographic background between the participants and the authorative figures from the SFSO varied very little. Similar to the toddlers, with the necessary adjustments and poststratification, the demographic background became more comparable (Annex E for cantonal details).

Table 5. Demographic comparison (%) of children participating in the survey in the German-, French-, and Italian-speaking regions with and without weights, nonresponse adjustments and poststratification, 1999-2003

a. Toddlers

	German			French			Italian			Switzerland				
	5755			2290			684			8729			77547	
	Survey			Survey			Survey			Survey			SFSO	
	n	no adj.	adj.	n	no adj.	adj.	n	no adj.	adj.	n	no adj.	adj.	n	%
Nationality														
Swiss	4981	86.6	74.4	1757	76.7	67.0	406	59.4	72.5	7144	81.8	72.4	56136	72.4
Foreigners	774	13.4	25.6	533	23.3	33.0	278	40.6	27.5	1585	18.2	27.6	21411	27.6
Gender														
Male	2993	52.0	51.6	1202	52.5	50.9	358	52.3	51.7	4553	52.2	51.4	39661	51.1
Female	2762	48.0	48.4	1088	47.5	49.1	326	47.7	48.3	4176	47.8	48.6	37886	48.9
Urbanicity														
City	2708	51.1	65.4	809	50.9	58.1	-	-	-	3517	51.1	63.4	39039	63.5
Land	2587	48.9	34.6	779	49.1	41.9	-	-	-	3366	48.9	36.5	22479	36.5

b. School entry

	German			French			Switzerland				
	6337			2323			8660			83794	
	Survey			Survey			Survey			SFSO	
	n	no adj.	adj.	n	no adj.	adj.	n	no adj.	adj.	n	%
Nationality											
Swiss	4934	77.9	79.0	1814	78.1	72.2	6748	77.9	77.3	64607	77.1
Foreigners	1403	22.1	21.0	509	21.9	27.8	1912	22.1	22.7	19183	22.9
Gender											
Male	3184	50.2	50.6	899	49.8	50.8	4083	50.2	50.6	42309	50.6
Female	3153	49.8	49.4	905	50.1	49.2	4058	49.8	49.4	41435	49.4

c. School departure

	German			French			Switzerland				
	6072			2739			8811			76603	
	Survey			Survey			Survey			SFSO	
	n	no adj.	adj.	n	no adj.	adj.	n	no adj.	adj.	n	%
Nationality											
Swiss	4906	80.8	79.0	2147	78.4	73.8	7053	80.0	77.6	59299	77.4
Foreigners	1166	19.2	21.0	592	21.6	26.2	1758	20.0	22.3	17304	22.6
Gender											
Male	3068	50.5	50.6	1018	51.6	49.2	4024	50.0	50.6	38750	50.6
Female	3004	49.5	49.4	956	48.4	50.8	4022	50.0	49.4	37854	49.4

Note: not all information was available for all cantons. adj.: adjustments, includes weights, nonresponse adj., poststratification.

SFSO: Figures provided by the Swiss Federal Statistical Office and cantonal offices of statistics.

Total compiled for period between 1999-2003.

3.3 Immunization coverage

Immunization coverage varies within all 3 different age groups (Table 6). 78.0% of the toddlers living in Switzerland are UTD with the 33333111 DTPPolHibMMR series and 70.6% at the 44443111 series. More specifically, cantons SH, AR, AI are among the lowest to be vaccinated, at 49.4%, 66.4%, 66.7%, respectively, for the 33333111 series while TI at 90.7%, VS at 89.6%, and GE at 87.4% are the highest (Annex F.1); for the 44443111 series, SH and AI remain as the cantons with the lowest vaccination coverage while GE and TI as the highest. When analyzing vaccination coverage by the different linguistic regions, toddlers residing in the German-speaking region are only 74.6% UTD for the 33333111 series and 67.0% for the 44443111 series, whereby toddlers in the French-speaking region have a coverage of 86.0% and 78.6%, respectively, and for the canton of TI, coverage levels are even higher at 90.7% and 85.6%, respectively.

Only 69.2% of the children at school entry are UTD at the 33333111 series, 49.2% at the 44443111 series, 16.0% at the 55553111 series and 9.9% at the 55553222 series. The same trend can be observed by the children at school entry as compared to the toddlers for all three series, with the children in the German-speaking region having the lowest immunization coverage, followed by the French-speaking region, with the Italian-speaking region having the highest coverage. Due to missing information for Per and Hib from some school classes (total of 3 classes for children at school entry and 6 for those at school departure), coverage estimates were also examined without including Per and Hib for toddlers and children at school entry for comparative purposes. When not considering Per and Hib, coverage estimates for toddlers remained similar to the series with Per and Hib at 79.8% and 73.0% at the 33030111 and 44040111, respectively, DTPPolHibMMR series. For children at school entry, there is a large difference where 84.8% are vaccinated at the 33030111 DTPPolHibMMR series, 81.7% at the 44040111 series, 52.6% at the 55050111 series, and 29.6% at the 55050222 series. More specifically, the canton of SH is lowest at 56.7% for the 33333111 series and 25.1% for the 44443111 series while TI displays the highest coverage at 86.5% and

83.9%, respectively (Annex F.2.1, F.2.2). Even when not considering Per and Hib in the DTPPolHibMMMR immunization series, the same trends are seen at the cantonal level.

Finally, this pattern as observed in the two younger age groups, can also be seen by children at school departure, with the DTPPolMMR series which included Per being slightly lower as compared to the series examined without Per. Here the cantons of VS and OW have the lowest coverage for the 6 different DTPPolMMR series while SZ has the highest coverage (Annex F.3.1, F.3.2), regardless if the series included Per or not. Additionally, cantons UR and ZG are often among the cantons with the highest immunization coverage levels for the series requiring 3, 4 or 5 doses for Di and Te, i.e. 3333111, 4434111, 5535111 and 5535222, whereas cantons VD and AG are among the highest for immunization series requiring 6 doses for Di and Te, i.e. 6635111 and 6635222.

Table 6. Vaccination coverage at different DTPPolHibMMR series, with and without pertussis and Hib among toddlers 24-35 months of age and children at school entry and DTPPolMMR for in the German-, French- and Italian-speaking regions of Switzerland, 1999-2003

Age groups	Regions	% coverage at different DTPPolHibMMR series		
		n	33030111	44040111
Toddlers (without pertussis and Hib)	German-speaking	5755	76.3	69.7
	French-speaking	2282	87.8	80.6
	Italian-speaking	684	92.4	87.1
	Switzerland	8721	79.8	73.0
		n	33333111	44443111
Toddlers (with pertussis and Hib)	German-speaking	5755	74.6	67.0
	French-speaking	2282	86.0	78.6
	Italian-speaking	679	90.7	85.6
	Switzerland	8716	78.0	70.6

Age groups	Regions	% coverage at different DTPPolHibMMR series				
		n	33030111	44040111	55050111	55050222
School entry (without pertussis and Hib)	German-speaking	6313	83.3	80.4	52.7	33.2
	French-speaking	2019	87.8	84.5	53.5	18.1
	Italian-speaking	789	92.4	90.0	45.4	32.7
	Switzerland	9121	84.8	81.7	52.6	29.6
		n	33333111	44443111	55553111	55553222
School entry (with pertussis and Hib)	German-speaking	6275	67.1	44.8	11.9	9.1
	French-speaking	2018	72.6	56.9	24.0	9.0
	Italian-speaking	787	86.5	83.9	42.1	30.9
	Switzerland	9080	69.2	49.2	16.0	9.9

Age groups	Regions	% coverage at different DTPPolMMR series						
		n	3303111	4404111	5505111	5505222	6605111	6605222
School departure (without pertussis)	German-speaking	6043	83.7	81.3	72.0	40.9	47.4	31.8
	French-speaking	2320	84.9	82.1	71.8	49.0	44.7	36.9
	Italian-speaking	681	87.2	86.3	75.9	48.2	50.1	38.5
	Switzerland	9044	84.2	81.7	72.1	43.2	47.2	33.3
		n	3333111	4434111	5535111	5535222	6635111	6635222
School departure (with pertussis)	German-speaking	5931	75.7	75.0	67.7	38.6	45.0	30.2
	French-speaking	2320	78.3	76.8	68.4	46.6	44.7	35.7
	Italian-speaking	678	78.2	78.0	70.1	45.7	45.7	36.4
	Switzerland	8929	76.5	75.6	68.0	40.9	44.9	31.9

JU: not included for schoolchildren since vaccination cards were not collected. TI toddlers: data collected from children in Kindergarten via school classes.
"n"s for with and without Per and /or Hib do not equate as it was not possible to assess them from some vax cards. toddlers: missing info on Hib for 5 kids in TI.
school entry: in addition to single cases from TI, VD and ZG, Per and/or Hib were not assessed for 2 classes (13 kids) from AI and 24 kids from BS.
school exit: in addition to a couple of cases from SG, SH and TI, Per and /or Hib were not assessed for 3 classes (28 kids) from AI, 2 classes (21 kids) from GR, and 57 kids from BS.

Table 6.1 presents a summary of the coverage, along with the range, by vaccine per dose for all three age groups. Coverage estimates for the first 3 doses of Di, Te, and Pol for all 3 age groups, including Per and Hib for the toddlers, are relatively high (> 90%). After this, coverage declines, for example to as low as 83.6% for 4 doses of Di for toddlers, 60.0% for 5 doses for children at school entry and 51.4% for 6 doses for the teenagers. Coverage levels for 1 dose of measles, mumps and rubella are 82.3%, 81.1% and 80.8%, respectively, for toddlers and increase to 88.4%, 87.0% and 86.6% for those at school entry (Table 6.1, Annex F.4); they remain around 50% at 2 doses for all 3 vaccines for the adolescents. For children at school departure, HepB coverage estimates had a wide range, from 7.5% to 88.3% (mean 46.3%) for 1 dose, 6.7% to 82.0% (mean 40.8%) for 2 doses and 2.3% to 68.3% (mean 25.9%) for 3 doses. Here cantons AI, UR and SZ always have the lowest coverage estimates for all 3 doses for HepB, whereas cantons NW and VD have the highest for the 1st and 2nd doses (Annex F.4).

Table 6.1 Vaccination coverage (%) by number of doses, Switzerland 1999-2003
(cantonal range)

a) toddlers (24-35 months)

Vaccination	Doses						
	0	≥1	≥2	≥3	≥4	≥5	≥6
Diphtheria	**2.8**	**97.2**	**96.6**	**95.4**	**83.6**		
	0 – 9.3	90.7 – 100.0	89.5 – 99.2	88.7 – 98.5	66.8 – 92.4		
Tetanus	**2.1**	**97.9**	**97.3**	**95.9**	**83.7**		
	0 – 7.8	92.2 – 100.0	91.1 – 99.5	89.9 – 98.5	67.2 – 92.4		
Pertussis	**5.3**	**94.7**	**94.1**	**92.9**	**81.3**		
	0.7 – 13.2	86.8 – 99.3	86.4 – 98.2	86.0 – 97.8	63.7 – 92.0		
Poliomyelitis	**2.8**	**97.2**	**96.6**	**95.3**	**82.7**		
	0.3– 8.9	91.1 – 99.7	90.3 – 99.5	89.1 – 97.8	61.1 – 90.8		
H. influenzae	**5.9**	**94.1**	**92.8**	**91.1**	**79.3**		
	1.1 – 12.4	87.6 – 98.9	87.6 – 97.0	86.0 – 96.0	60.8 – 87.1		
Measles	**17.7**	**82.3**	**7.8**				
	6.3 – 31.4	68.6 – 93.7	0 – 48.2				
Mumps	**18.9**	**81.1**	**7.7**				
	6.7 – 33.2	66.8 – 93.3	0 – 47.8				
Rubella	**19.2**	**80.8**	**7.7**				
	6.7 – 48.7	51.3 – 93.3	47.8				

b) school entry (Grades: Kindergarten, 1-3)

Vaccination	Doses						
	0	≥1	≥2	≥3	≥4	≥5	≥6
Diphtheria	**0.9**	**99.1**	**98.0**	**97.1**	**92.5**	**60.0**	
	0 – 2.9	97.1 – 100.0	95.8 – 100.0	94.1 – 98.8	83.2 – 95.6	14.6 – 80.9	
Tetanus	**0.6**	**99.4**	**98.3**	**97.3**	**92.7**	**60.2**	
	0 – 2.2	97.8 – 100.0	98.8 – 100.0	94.1 – 98.8	85.6 – 98.9	14.6 – 80.9	
Pertussis	**6.6**	**93.4**	**91.0**	**88.9**	**60.9**	**19.4**	
	1.1 – 15.7	84.3 – 98.9	69.9 – 97.7	64.0 – 96.8	32.1 – 92.8	1.2 – 51.5	
Poliomyelitis	**0.9**	**99.1**	**98.0**	**97.0**	**92.0**	**59.6**	
	0 – 2.4	97.6 – 100.0	96.0 – 100.0	93.5 – 98.8	73.6 – 95.9	9.2 – 78.8	
H. influenzae	**9.9**	**90.1**	**86.6**	**78.3**	**26.6**		
	3.3 – 15.6	84.4 – 96.7	79.5 – 96.6	67.5 – 91.3	3.0 – 80.1		
Measles	**11.6**	**88.4**	**36.6**				
	6.2 – 19.3	80.7 – 93.8	3.5 – 69.6				
Mumps	**13.0**	**87.0**	**36.0**				
	6.3 – 23.6	76.4 – 93.7	3.0 – 69.4				
Rubella	**13.4**	**86.6**	**35.9**				
	6.3 – 38.1	61.9 – 93.7	3.0 – 69.6				

c) school exit (Grades: 6-9)

Vaccination	Doses						
	0	≥1	≥2	≥3	≥4	≥5	≥6
Diphtheria	**1.1**	**98.9**	**95.5**	**93.1**	**90.2**	**81.6**	**51.4**
	0 – 5.1	94.9 – 100.0	87.7 – 99.2	86.3 – 99.2	81.6 – 95.9	56.3 – 94.0	15.8 – 78.7
Tetanus	**1.0**	**99.0**	**95.7**	**93.3**	**90.5**	**82.2**	**52.1**
	0 – 5.1	94.9 – 100.0	87.9 – 100.0	86.7 – 99.2	82.8 – 96.2	58.9 – 94.0	17.3 – 78.8
Pertussis	**12.5**	**87.5**	**86.0**	**83.5**	**12.9**	**3.4**	
	2.1 – 55.8	44.2 – 97.9	42.4 – 96.2	41.1 – 95.0	0.7 – 28.7	0.0 – 22.5	
Poliomyelitis	**1.1**	**98.9**	**95.7**	**93.0**	**90.0**	**80.7**	
	0 – 6.8	93.2 – 100.0	89.2 – 100.0	86.0 – 98.4	84.1 – 96.2	64.0 – 91.7	
Measles	**6.2**	**93.8**	**54.0**				
	0.9– 16.0	84.0 – 99.1	13.5 – 82.6				
Mumps	**6.9**	**93.1**	**52.7**				
	0.9 – 18.2	81.8 – 99.1	12.3 – 82.6				
Rubella	**9.4**	**90.6**	**49.8**				
	0 – 20.5	79.5 – 100.0	12.3 – 82.6				
Hepatitis B	**53.7**	**46.3**	**40.8**	**25.9**			
	11.7 – 92.5	7.5 – 88.3	6.7 – 82.0	2.3 – 68.3			

JU: not included for schoolchildren. BE: Per ≥4 doses and MMR ≥ 2 doses were not considered; Reference: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003. 26: 445-50. TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.

Using information extracted from the vaccination card, 219 (2.0%) children 24-35 months remain completely unvaccinated, 39 (0.4%) for those at school entry, and 48 (0.5%) for those at school departure (Table 7, Annex G). More specifically, the German-speaking region has the majority of the kids who are unvaccinated living in their area. The total number of children who remain unvaccinated is relatively small, with more toddlers remaining unvaccinated as compared to schoolchildren.

Table 7. Distribution of children who remain unvaccinated among toddlers 24-35 months of age and children at school entry and departure in the German-, French- and Italian-speaking regions of Switzerland, 1999-2003

		Unvaccinated children		
Age groups	Regions	N	n	%
Toddlers	German-speaking	5734	203	2.6
	French-speaking	2282	16	0.7
	Italian-speaking	679	0	0.0
	Switzerland	8715	219	2.0
School entry	German-speaking	6275	38	0.6
	French-speaking	2018	0	0.0
	Italian-speaking	787	1	0.1
	Switzerland	9080	39	0.4
School departure	German-speaking	6043	29	0.4
	French-speaking	2320	13	0.5
	Italian-speaking	681	6	0.9
	Switzerland	9044	48	0.5

"Not vaccinated status" is determined by vaccination card. Because vaccination cards were not collected in canton JU, questionnaires used to confirm vaccination status. Hence, the calculation for school children does not include JU.

3.4 Demographic influence on immunization coverage

Tables 8 display results from the logistic regression analysis for social and demographic factors extracted from the questionnaire with immunization coverage. Sex does not play a significant role in vaccination coverage; in contrast, the total number of siblings, both older and younger, are significant factors in vaccination coverage, but only with selected vaccines. 95.0% of toddlers who have 1 or more siblings are vaccinated with 3 doses for Di compared to 97.4% of those who do not have any siblings (Table 8.1).

The odds of being UTD at 3 doses of Di among toddlers who have 1 or more siblings is 0.52 (CI: 0.34, 0.79) times that of those who do not have any siblings. Furthermore, the odds of being UTD for Di at 3 doses among toddlers with more than one younger sibling is 0.69 times (CI: 0.51, 0.93) that of those with no younger siblings. In this case, only 94.4% of those with younger siblings are UTD for 3 doses of Di, in comparison to 96.1% of those without younger siblings. Similar to Di at 3 doses, toddlers with siblings are significantly less vaccinated for measles than those with no siblings, with 81.2% and 84.8%, respectively, and the odds ratio being 0.77 (CI: 0.62, 0.97). Toddlers with older siblings have a significantly lower chance of being UTD for measles at 1 dose than those without older siblings, with the odds being 0.83 (CI: 0.70, 0.97). Another significant factor associated with being UTD for measles at one dose and series 33333111 is the nationality of the child. 82.2% of children of foreign background are UTD at the series 33333111 compared to only 76.4% of Swiss toddlers; for measles at one dose, they are 87.7% and 80.2%, respectively. The odds of being UTD for measles at one dose among children of foreign ethnicity is 1.76 (CI: 1.40, 2.20) times that of the Swiss children; at series 33333111 the odds of being UTD among non-Swiss children is 1.42 (CI: 1.19, 1.68) times that of Swiss children. Closer examination of the nationality of the children revealed in Table 8.1.1 that only children from countries designated as from southern Europe are significantly better vaccinated against Di and Hib and are more likely to be UTD at the 333333111 series than Swiss children. The odds of being UTD for 3 doses of Di, Hib and at the 333333111series among children from southern Europe is 2.85 (CI: 1.28, 6.34), 2.42 (1.24, 4.72) and 4.54 (CI: 2.91, 7.09), respectively, times that of Swiss children. For measles at one dose, the odds is increased to 7.39 (CI: 4.40, 12.43) times; children of African background also have a significantly higher chance of being vaccinated for measles than Swiss children (odds ratio: 4.28 (CI: 1.40, 13.07)).

Table 8.1. Logistic regression of social and demographic factors and vaccination coverage for DTPPolHibMMR for the number of doses at series 3333111, diphtheria at 3 doses, *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children 24-35 months of age living in Switzerland, 1999-2003

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)		Coverage Di (3 doses) %(±95%CI)	Odds Ratio Di (3 doses) (±95%CI)	
sex of child	female	4553	51.4	78.5 (76.4, 80.5)		ref	95.5 (94.6, 96.4)		ref
	male	4176	48.6	77.6 (75.7, 79.5)	0.94	(0.81, 1.10)	95.3 (94.4, 96.2)	0.96	(0.73, 1.25)
sibling	none	1820	25.2	80.6 (77.4, 83.8)		ref	97.4 (96.3, 98.5)		ref
	≥1	6039	74.8	77.0 (75.3, 78.6)	0.80	(0.64, 1.00)	95.0 (94.3, 95.8)	**0.52**	**(0.34, 0.79)**
younger sibling	none	5546	72.3	78.8 (76.9, 80.6)		ref	96.1 (95,4, 96.8)		ref
	≥1	2313	27.7	75.6 (72.9, 78.3)	0.84	(0.69, 1.00)	94.4 (93.1, 95.8)	**0.69**	**(0.51, 0.93)**
older sibling	none	3413	45.3	79.2 (77.0, 81.4)		ref	96.3 (95.2, 97.4)		ref
	≥1	4446	54.7	76.8 (74.9, 78.7)	0.87	(0.74, 1.02)	95.1 (94.2, 95.9)	0.74	(0.52, 1.05)
nationality of child	Swiss	7144	72.4	76.4 (74.6, 78.1)		ref	95.1 (94.4, 95.8)		ref
	nonSwiss	1585	27.6	82.2 (79.7, 84.6)	**1.42**	**(1.19, 1.68)**	96.2 (94.9, 97.5)	1.31	(0.90, 1.90)
educational level of the mother	low	965	15.5	83.9 (80.9, 87.0)		ref	96.5 (94.8, 98.2)		ref
	middle	5563	63.4	78.4 (76.7, 80.1)	**0.69**	**(0.55, 0.88)**	96.0 (95.2, 96.7)	0.86	(0.51, 1.45)
	high	1604	21.1	73.0 (69.5, 76.5)	**0.52**	**(0.39, 0.68)**	93.6 (92.0, 95.2)	**0.53**	**(0.30, 0.91)**

variable		n	%	Coverage Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
sex of child	female	4553	51.4	91.2 (90.0, 92.5)		ref	82.4 (80.4, 84.3)		ref
	male	4176	48.6	91.0 (89.8, 92.3)	0.97	(0.80, 1.19)	82.2 (80.5, 83.8)	0.99	(0.84, 1.17)
sibling	none	1820	25.2	92.6 (90.7, 94.5)		ref	84.8 (82.1, 87.4)		ref
	≥1	6039	74.8	90.7 (89.6, 91.8)	0.78	(0.57, 1.07)	81.2 (79.7, 82.7)	**0.77**	**(0.62, 0.97)**
younger sibling	none	5546	72.3	95.8 (95.0, 96.5)		ref	82.9 (81.2, 84.5)		ref
	≥1	2313	27.7	94.8 (93.7, 95.9)	0.84	(0.64, 1.10)	80.1 (77.5, 82.8)	0.83	(0.68, 1.03)
older sibling	none	3413	45.3	91.8 (90.4, 93.2)		ref	83.6 (81.7, 85.6)		ref
	≥1	4446	54.7	90.7 (89.5, 91.9)	0.87	(0.69, 1.09)	80.8 (79.1, 82.5)	**0.83**	**(0.70, 0.97)**
nationality of child	Swiss	7144	72.4	90.6 (89.5, 91.7)		ref	80.2 (78.7, 81.7)		ref
	nonSwiss	1585	27.6	92.5 (90.6, 94.4)	1.28	(0.95, 1.71)	87.7(85.4, 90.0)	**1.76**	**(1.40, 2.20)**
educational level of the mother	low	965	15.5	93.2 (90.9, 95.6)		ref	88.1 (85.1, 91.1)		ref
	middle	5563	63.4	91.8 (90.7, 92.9)	0.81	(0.55, 1.19)	82.8 (81.1, 84.5)	**0.65**	**(0.48, 0.89)**
	high	1604	21.1	88.7 (86.5, 90.9)	**0.57**	**(0.38, 0.86)**	76.6 (73.0, 80.4)	**0.44**	**(0.31, 0.63)**

CI: confidence interval. ref: reference group. TI: not included in analysis for siblings

Table 8.1.1 Logistic regression of nationality and vaccination coverage for DTPPolHibMMR for the number of doses at series 3333111, diphtheria at 3 doses, Haemophilus influenzae type B (Hib) at 3 doses and measles at 1 dose for children aged 24-35 months living in Switzerland, 1999-2003

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)		Coverage Di (3 doses) %(±95%CI)	Odds Ratio Di (3 doses) (±95%CI)	
nationality of child	Swiss	7007	72.4	76.3 (74.7, 78.0)		ref	95.1 (94.4, 95.8)		ref
	Europe (EU + Norway)	929	15.6	83.7 (79.7, 87.8)	**1.59**	**(1.19, 2.13)**	96.8 (95.1, 98.6)	1.58	(0.87, 2.85)
	Eastern Europe, incl. Turkey	398	8.3	79.6 (74.0, 85.1)	1.21	(0.86, 1.69)	96.1 (93.3, 98.9)	1.26	(0.60, 2.65)
	Asia	75	1.6	79.2 (67.5, 90.8)	1.78	(0.58, 2.38)	88.4 (78.0, 98.8)	0.39	(0.14, 1.08)
	Others	123	2.1	82.7 (73.2, 92.2)	1.48	(0.74, 2.96)	97.8 (95.7, 99.9)	2.28	(0.84, 6.17)
nationality of child **(in more detail- does not include BE, TI, TG)**	Swiss	6158	71.2	76.1 (74.2, 78.0)		ref	95.0 (94.2, 95.8)		ref
	Northern + Western Europe	223	5.6	67.3 (57.1, 77.5)	0.65	(0.41, 1.02)	95.0 (91.0, 100.0)	1.02	(0.34, 3.01)
	Southern Europe	464	11.2	93.5 (90.8, 96.3)	**4.54**	**(2.91, 7.09)**	98.2 (96.8, 99.6)	**2.85**	**(1.28, 6.34)**
	Eastern Europe	344	8.3	77.7 (71.2, 84.2)	1.09	(0.75, 1.60)	95.5 (92.0, 98.9)	1.11	(0.51, 2.44)
	Canada, US, Australia	25	0.5	70.0 (44.9, 93.0)	0.70	(0.22, 2.22)	97.3 (91.8, 102.8)	1.92	(0.23, 15.80)
	Latin America, Caribbean	20	0.6	84.9 (67.2, 102.6)	1.77	(0.43, 7.22)	95.4 (88.6, 102.2)	1.10	(0.23, 5.23)
	Asia	69	1.8	80.2 (68.2, 92.1)	1.27	(0.60, 2.69)	90.0 (79.4, 100.5)	0.47	(0.15, 1.51)
	Africa	47	0.9	85.1 (74.7, 95.5)	1.80	(0.78, 4.13)	98.1 (94.3, 101.9)	2.71	(0.36, 20.34)

variable		n	%	Coverage Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
nationality of child	Swiss	7007	72.4	90.6 (89.5, 91.7)		ref	80.1 (78.6, 81.6)		ref
	Europe (EU + Norway)	929	15.6	93.7 (91.0, 96.4)	1.54	(0.97, 2.44)	88.2 (84.9, 91.4)	**1.85**	**(1.36, 2.52)**
	Eastern Europe, incl. Turkey	398	8.3	91.0 (87.2, 94.7)	1.05	(0.65, 1.69)	86.1 (81.4, 90.8)	**1.54**	**(1.03, 2.30)**
	Asia	75	1.6	86.7 (76.3, 97.0)	0.68	(0.27, 1.66)	92.3 (84.4, 100.2)	2.98	(0.98, 9.10)
	Others	123	2.1	93.8 (90.0, 97.7)	1.58	(0.79, 3.16)	87.3 (79.6, 95.0)	1.70	(0.83, 3.50)
nationality of child **(in more detail- does not include BE, TI, TG)**	Swiss	6158	71.2	90.6 (89.3, 91.7)		ref	80.1 (78.3, 81.8)		ref
	Northern + Western Europe	223	5.6	89.6 (83.6, 95.6)	0.90	(0.47, 1.74)	75.3 (66.3, 84.3)	0.76	(0.47, 1.23)
	Southern Europe	464	11.2	95.9 (93.2, 98.5)	**2.42**	**(1.24, 4.72)**	96.7 (95.1, 98.4)	**7.39**	**(4.40, 12.43)**
	Eastern Europe	344	8.3	90.3 (86.1, 94.6)	0.98	(0.58, 1.65)	85.4 (80.0, 90.8)	1.45	(0.93, 2.27)
	Canada, US, Australia	25	0.5	92.9 (85.3, 100.4)	1.36	(0.42, 4.42)	76.0 (57.0, 95.0)	0.79	(0.27, 2.29)
	Latin America, Caribbean	20	0.6	95.4 (88.6, 102.2)	2.16	(0.45, 10.34)	84.9 (67.2, 102.6)	1.40	(0.34, 5.76)
	Asia	69	1.8	88.3 (77.8, 98.8)	0.79	(0.29, 2.16)	91.9 (83.4, 100.4)	2.81	(0.90, 8.82)
	Africa	47	0.9	89.1 (80.9, 97.3)	0.85	(0.36, 2.04)	94.5 (88.7, 100.3)	**4.28**	**(1.40, 13.07)**

CI: confidence interval;ref: reference group.

BE, TI, TG: detailed regrouping of nationality could not be done as further detail into nationality was not assessed.

By the children at school entry, sex, the total number of siblings and the number of younger siblings are not significantly associated with vaccination coverage (Table 8.2). More prominent than with the toddlers, having an older sibling plays a significant role in influencing the chance that a child at school entry will be vaccinated. Children with older siblings have a lower chance of being UTD for the 44443111 series, for Di at 4 doses, for Hib at 3 doses and for measles at one dose. In contrast to toddlers, children of foreign background at school entry are significantly less likely to be vaccinated than their Swiss counterpart. The odds of being UTD at series 33333111among children of foreign background is 0.85 (CI: 0.74, 0.99) times that of Swiss children; for Di at 4 doses, it is 0.36 (CI: 0.28, 0.46) times; and for Hib at 3 doses, it is 0.48 (CI: 0.42, 0.56). However, the odds of these children being vaccinated for 1 dose of measles is 1.99 (CI: 1.53, 2.57) times that of Swiss children. Further investigation into the influence of nationality reveals the same trend in Table 8.2.1, with children, whose nationality is among one of the countries in the European Union or Norway, having the same chances of being UTD at the 44443111 series and 4 doses of Di and 3 doses of Hib as the Swiss children; children of Eastern European background, including Turkey, have a lower chance with the odds being 0.61 (CI: 0.48, 0.79), 0.22 (CI: 0.16, 0.31) and 0.31 (CI: 0.25, 0.38), respectively. In contrast, for measles at one dose, the pattern is reversed, where the former has a significantly higher chance at being UTD with the odds being 2.51 (CI: 1.58, 3.99) times that of the Swiss.

Table 8.2. Logistic regression of social and demographic factors and vaccination coverage for DTPPolHibMMR for the number of doses at series 4443111, diphtheria at 4 doses, *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children at school entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)	
sex of child	female	3906	49.4	46.2 (43.9, 48.6)		ref	91.6 (90.4, 92.9)		ref
	male	3934	50.6	44.3 (42.1, 46.4)	0.92	(0.83, 1.03)	92.5 (91.3, 93.6)	1.12	(0.89, 1.40)
sibling	none	703	10.5	50.6 (45.8, 55.4)		ref	91.6 (89.6, 94.4)		ref
	≥1	5867	89.5	45.8 (43.8, 47.8)	0.82	(0.68, 1.00)	92.6 (91.7, 93.6)	1.10	(0.78, 1.53)
younger sibling	none	3319	50.5	45.5 (43.0, 47.9)		ref	92.0 (90.7, 93.3)		ref
	≥1	3251	49.5	47.1 (44.7, 49.5)	1.07	(0.95, 1.20)	93.1 (91.9, 94.4)	1.17	(0.90, 1.52)
older sibling	none	2794	42.9	50.0 (47.5, 52.5)		ref	94.2 (93.0, 95.3)		ref
	≥1	3776	57.1	43.5 (41.2, 45.8)	**0.77**	**(0.69, 0.86)**	91.3 (90.0, 92.6)	**0.65**	**(0.50, 0.84)**
nationality of child	Swiss	6474	77.2	48.7 (46.7, 50.6)		ref	94.3 (93.6, 95.1)		ref
	nonSwiss	1885	22.8	44.9 (41.5, 48.2)	**0.85**	**(0.74, 0.99)**	85.7 (83.3, 88.1)	**0.36**	**(0.28, 0.46)**
educat. level of the mother	low	1135	17.4	45.5 (41.3, 49.8)		ref	86.6 (83.7, 89.5)		ref
	middle	4223	67.7	47.0 (44.8, 49.3)	1.06	(0.88, 1.28)	94.4 (93.5, 95.3)	**2.60**	**(1.94, 3.49)**
	high	945	14.9	44.5 (40.7, 48.4)	0.96	(0.77, 1.20)	91.8 (89.8, 93.9)	**1.74**	**(1.20, 2.51)**

variable		n	%	Coverage Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
sex of child	female	3906	49.4	77.8 (75.8, 79.8)		ref	88.1 (86.7, 89.5)		ref
	male	3934	50.6	76.9 (75.2, 78.6)	0.95	(0.82, 1.10)	87.7 (86.2, 89.2)	0.96	(0.81, 1.14)
sibling	none	703	10.5	77.0 (72.9, 81.2)		ref	90.7 (87.9, 93.4)		ref
	≥1	5867	89.5	79.1 (77.5, 80.6)	1.13	(0.89, 1.42)	88.6 (87.5, 89.7)	0.80	(0.58, 1.11)
younger sibling	none	3319	50.5	77.8 (75.8, 79.9)		ref	88.6 (87.1, 90.1)		ref
	≥1	3251	49.5	79.9 (78.0, 81.8)	1.13	(0.97, 1.32)	89.0 (87.5, 90.5)	1.04	(0.85, 1.28)
older sibling	none	2794	42.9	82.2 (80.3, 84.1)		ref	90.3 (88.8, 91.8)		ref
	≥1	3776	57.1	76.3 (74.5, 78.2)	**0.70**	**(0.60, 0.81)**	87.7 (86.4, 89.1)	**0.77**	**(0.64, 0.94)**
nationality of child	Swiss	6474	77.2	80.9 (79.5, 82.3)		ref	86.9 (85.7, 88.1)		ref
	nonSwiss	1885	22.8	67.2 (64.4, 70.0)	**0.48**	**(0.42, 0.56)**	92.9 (91.3, 94.5)	**1.99**	**(1.53, 2.57)**
educat. level of the mother	low	1135	17.4	75.1 (71.5, 78.8)		ref	93.0 (90.9, 95.1)		ref
	middle	4223	67.7	81.1 (79.4, 82.7)	**1.42**	**(1.14, 1.76)**	88.7 (87.5, 89.9)	**0.59**	**(0.42, 0.83)**
	high	945	14.9	74.4 (70.7, 78.2)	0.96	(0.74, 1.25)	84.8 (82.0, 87.6)	**0.42**	**(0.29, 0.61)**

CI: confidence interval. ref: reference group. BE, JU, TI: not included in analysis. VD: included only for nationality.

Table 8.2.1 Logistic regression of nationality and vaccination coverage for DTPPolHibMMR for the number of doses at series 4443111, diphtheria at 4 doses, *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children at school entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)	
nationality of child	Swiss	6047	78.0	45.9 (43.9, 47.9)		ref	94.2 (93.4, 95.0)		ref
	Europe (EU + Norway)	684	9.1	51.6 (46.6, 56.6)	1.26	(1.02, 1.55)	93.5 (90.8, 96.1)	0.88	(0.56, 1.38)
	E. Europe, incl. Turkey	788	9.5	34.3 (29.0, 39.5)	**0.61**	**(0.48, 0.79)**	78.5 (73.8, 83.2)	**0.22**	**(0.16, 0.31)**
	Asia	73	1.1	43.8 (27.1, 60.4)	0.92	(0.46, 1.81)	78.9 (67.2, 90.6)	**0.23**	**(0.11, 0.47)**
	Others	166	2.3	31.1 (22.3, 39.8)	**0.53**	**(0.35, 0.81)**	78.9 (71.2, 86.6)	**0.23**	**(0.14, 0.37)**

variable		n	%	Coverage Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
nationality of child	Swiss	6047	78.0	80.6 (79.1, 82.0)		ref	86.5 (85.3, 87.8)		ref
	Europe (EU + Norway)	684	9.1	80.3 (76.3, 84.3)	0.98	(0.76, 1.27)	94.2 (91.7, 96.6)	**2.51**	**(1.58, 3.99)**
	E. Europe, incl. Turkey	788	9.5	56.1 (51.2, 61.1)	**0.31**	**(0.25, 0.38)**	91.5 (88.6, 94.4)	1.66	(1.13, 2.44)
	Asia	73	1.1	69.2 (55.3, 83.1)	0.54	(0.28, 1.05)	94.0 (87.5, 100.5)	2.43	(0.77, 7.63)
	Others	166	2.3	50.9 (40.6, 61.1)	**0.25**	**(0.16, 0.38)**	92.4 (87.9, 97.0)	1.90	(0.98, 3.66)

CI: confidence interval. ref: reference group. JU, TI, VD: not included in analysis

The demographic factors examined are also sporadically associated with vaccination coverage by the children at school departure (Table 8.3). Here the number of younger siblings does not play a significant role, but gender significantly influences coverage when examined at the DTPPolMMR immunization series 5505111 and for Pol at 5 doses. Only 68.3% of boys are vaccinated at the 5505111 series and 78.3% for Pol, compared to 73.2% and 81.4%, respectively, of the girls. The odds of being UTD at the 5505111 series and for 5 doses of Pol among boys is 0.79 (CI: 0.69, 0.91) and 0.83 (CI: 0.71, 0.97), respectively, times that of girls. This difference between boys and girls are also found for rubella, at one dose and two doses, where girls have significantly higher coverage estimates for rubella than boys at the national level (Annex H.1, H.2). The same trend can be seen with the number of siblings and the number of older siblings, with the same chances of being UTD for the 5505111 series and Pol significantly lower for those with siblings, particularly older siblings. The odds of being UTD for the 5505111 series for those with siblings is approximately 0.72 (CI: 0.53, 0.97) and older siblings is 0.77 (CI: 0.65, 0.90) times that of those without siblings. Unlike the two younger age groups, coverage for measles at one dose is not significantly associated with the number of siblings, regardless if they are older or younger. In

addition to siblings, nationality also plays a highly significant role on vaccination coverage, with children of foreign background being less likely to be UTD at the 5505111 series, and for 5 doses of Di and Pol. More specifically, the odds of these children being UTD at the 5505111 series is 0.35 (CI: 0.29, 0.41) times that of the Swiss children. The chances of being UTD for 5 doses of Di and Pol for those children of foreign background are even more reduced at 0.20 (CI: 0.17, 0.26) and 0.21 (CI: 0.17, 0.25), respectively. In contrast to the two younger groups, coverage for measles at one dose is not significantly associated with the ethnic background of the oldest age group. Sex and the number of siblings, regardless if they are older or younger, have no association with HepB coverage; on the other hand, children of foreign background are significantly better vaccinated than Swiss children for HepB (Table 8.3.1). The odds of being UTD for 1 dose of HepB for children of foreign background is 1.46 (CI: 1.20, 1.77) times that of Swiss children; the odds of being UTD for 3 doses of HepB is 1.39 (CI: 1.15, 1.68). More detailed analysis into the effect of nationality confirmed the aforedescribed phenomenon: aside from the 5505111 series for children whose nationality is part of the European Union or Norway, adolescents of foreign background have a significantly lower chance of being UTD at the 5505111 series, for 5 doses of Di and Pol than Swiss children; by HepB at 1 and 3 doses, the effect is in the opposite direction, where foreigners have a higher chance of being UTD (Table 8.3.2).

The highest level of education attained by the mother plays a significant role in immunization coverage ($p<0.05$). Toddlers of mothers with higher educational background (masters or university degree) are less likely to be UTD with the recommended vaccination plan at series 33333111 than those with middle (technical and teaching schools) and low educational backgrounds (completing 9 mandatory school years or lower), with vaccination coverage estimates at 73.0%, 78.4%, and 83.9%, respectively (Table 8.1). The odds of being UTD at series 33333111 among those with a middle degree of education is 0.69 (CI: 0.55, 0.88) times, and those with the highest educational background is 0.52 (CI: 0.39, 0.68) times, that of lower educational background. For Di and Hib at 3 doses, there is a significant difference between vaccination coverage only between those children whose mothers' educational level is classified as low and high, with high educational background

yielding significantly lower coverage. By measles for toddlers and children at school entry, this trend is also observed (Tables 8.1 and 8.2). For children at school entry, the odds of being UTD among children whose mothers‘ educational background lies in the middle is 2.60 (CI: 1.94, 3.49) times, and those with the highest educational background is 1.74 times (CI: 1.20, 2.51), that of lower educational background. For the children at school departure, teenagers whose mothers' educational level is rated as being in the middle have significantly the highest coverage estimates at the 5505111 series and for 5 doses of Di and Pol; adolescents of mothers with low educational background have the lowest coverage (Table 8.3). By measles at one dose, the odds of being UTD among teenagers whose mothers' educational background is defined as high is 0.51 (CI: 0.33, 0.77) times that of those whose mother's educational background is rated as low. Similarly, teenagers whose mother's educational level is rated low has a higher chance of being UTD for HepB than those whose mother's educational background is rated medium or high, although there is little or no difference in coverage estimates between the two latter groups (Table 8.3.1).

Table 8.3. Logistic regression of social and demographic factors and vaccination coverage for DTPPolMMR for the number of doses at series 5505111, diphtheria at 5 doses, polio at 5 doses and measles at 1 dose for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio series 5505111 (±95%CI)	Coverage Diphtheria (5 doses) %(±95%CI)	Odds Ratio Diphtheria (5 doses) (±95%CI)
sex of child	female	3801	49.4	73.2 (71.1, 75.3)	ref	81.5 (79.7, 83.4)	ref
	male	3829	50.6	68.3 (65.8, 70.8)	**0.79 (0.69, 0.91)**	79.7 (77.3, 82.0)	0.89 (0.76, 1.04)
sibling	none	459	7.8	77.8 (73.3, 82.3)	ref	84.7 (80.8, 88.6)	ref
	≥1	5414	92.2	71.5 (69.4, 73.6)	**0.72 (0.53, 0.97)**	79.9 (77.8, 81.9)	0.72 (0.51, 1.01)
younger sibling	none	2535	43.2	73.2 (70.6, 75.8)	ref	81.1 (78.9, 83.3)	ref
	≥1	3338	56.8	71.0 (68.5, 73.6)	0.90 (0.76, 1.06)	79.5 (77.2, 81.9)	0.90 (0.76, 1.07)
older sibling	none	2485	42.2	75.1 (72.9, 77.2)	ref	83.4 (81.4, 85,4)	ref
	≥1	3388	57.8	69.7 (67.0, 72.4)	**0.77 (0.65, 0.90)**	77.9 (75.5, 80.4)	**0.70 (0.59, 0.83)**
nationality of child	Swiss	6677	77.5	77.1 (75.6, 78.7)	ref	87.9 (86.8, 89.0)	ref
	nonSwiss	1718	22.5	53.8 (50.0, 57.7)	**0.35 (0.29, 0.41)**	59.6 (55.8, 63.3)	**0.20 (0.17, 0.26)**
educational level of the mother	low	1399	25.2	61.4 (57.5, 65.3)	ref	66.6 (62.6, 70.6)	ref
	middle	3499	62.1	76.6 (74.5, 78.8)	**2.06 (1.70, 2.50)**	85.7 (84.3, 87.2)	**3.01 (2.46, 3.70)**
	high	691	12.7	70.5 (66.4, 74.6)	**1.50 (1.17, 1.92)**	81.9 (78.0, 85.8)	**2.27 (1.67, 3.08)**

variable		n	%	Coverage Polio 5 doses) %(±95%CI)	Odds Ratio Polio (5 doses) (±95%CI)	Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)
sex of child	female	3801	49.4	81.3 (79.4, 83.3)	ref	94.6 (93.6, 95.5)	ref
	male	3829	50.6	78.3 (76.0, 80.6)	**0.83 (0.71, 0.97)**	93.3 (92.3, 94.4)	0.80 (0.62, 1.04)
sibling	none	459	7.8	86.7 (82.9, 90.6)	ref	94.5 (91.9, 97.2)	ref
	≥1	5414	92.2	78.7 (76.6, 80.8)	**0.57 (0.39, 0.82)**	94.5 (93.7, 95.2)	0.99 (0.59, 1.67)
younger sibling	none	2535	43.2	80.2 (77.7, 82.8)	ref	95.0 (94.0, 96.1)	ref
	≥1	3338	56.8	78.6 (76.3, 80.9)	0.90 (0.76, 1.08)	94.1 (93.1, 95.1)	0.83 (0.62, 1.11)
older sibling	none	2485	42.2	82.9 (81.1, 84.7)	ref	94.2 (93.1, 95.4)	ref
	≥1	3388	57.8	76.7 (74.0, 79.3)	**0.68 (0.57, 0.80)**	94.7 (93.8, 95.5)	1.09 (0.83, 1.42)
nationality of child	Swiss	7035	77.5	87.2 (85.9, 88.5)	ref	94.0 (93.3, 94.7)	ref
	nonSwiss	1758	22.5	58.3 (54.7, 62.0)	**0.21 (0.17, 0.25)**	93.4 (91.9, 94.9)	0.90 (0.69, 1.17)
educational level of the mother	low	1399	25.2	66.6 (63.0, 70.7)	ref	94.2 (92.5, 95.8)	ref
	middle	3499	62.1	84.6 (82.9, 86.4)	**2.77 (2.29, 3.35)**	95.4 (94.5, 96.3)	1.28 (0.90, 1.82)
	high	691	12.7	79.2 (75.4, 83.1)	**1.92 (1.46, 2.53)**	89.1 (86.2, 92.1)	**0.51 (0.33, 0.77)**

CI: confidence interval; ref: reference group
BE: only included in analysis for nationality and sex. JU, TI: not included in the analysis. VD: only included in analysis for nationality.

Table 8.3.1. Logistic regression of social and demographic factors and vaccination coverage for Hepatitis B (HepB) at one dose and three doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverage for HepB (3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
sex of child	female	3801	49.4	41.2 (37.8, 44.6)		ref	25.2 (22.6, 27.9)		ref
	male	3829	50.6	41.9 (38.4, 45.5)	1.03	(0.91, 1.17)	24.7 (22.1, 27.4)	0.97	(0.85, 1.11)
sibling	none	459	7.8	47.2 (39.9, 54.5)		ref	28.2 (22.6, 33.8)		ref
	≥1	5414	92.2	41.5 (37.7, 45.3)	0.79	(0.61, 1.04)	23.8 (21.1, 26.5)	0.80	(0.61, 1.04)
younger sibling	none	2535	43.2	41.1 (37.1, 45.1)		ref	23.2 (20.5, 25.8)		ref
	≥1	3338	56.8	42.6 (38.4, 46.8)	1.06	(0.93, 1.22)	24.9 (21.7, 28.2)	1.10	(0.95, 1.28)
older sibling	none	2485	42.2	44.0 (39.5, 48.5)		ref	25.5 (22.0, 28.9)		ref
	≥1	3388	57.8	40.4 (36.5, 44.4)	0.86	(0.74, 1.00)	23.2 (20.5, 25.9)	0.89	(0.76, 1.03)
nationality of child	Swiss	6677	77.5	43.2 (40.1, 46.4)		ref	23.0 (20.8, 25.3)		ref
	nonSwiss	1718	22.5	52.6 (48.2, 57.0)	**1.46**	**(1.20, 1.77)**	29.4 (25.6, 33.2)	**1.39**	**(1.15, 1.68)**
educational level of the mother	low	1399	25.2	47.6 (42.3, 52.8)		ref	29.1 (24.3, 33.9)		ref
	middle	3499	62.1	39.4 (35.1, 43.7)	**0.72**	**(0.57, 0.90)**	21.6 (18.9, 24.2)	**0.67**	**(0.53, 0.84)**
	high	691	12.7	39.4 (33.1, 45.7)	**0.72**	**(0.52, 0.99)**	23.5 (19.0, 28.1)	0.75	(0.54, 1.04)

CI: confidence interval. ref: reference group
BE: only included in analysis for nationality and sex. JU, TI: not included in the analysis. VD: only included in analysis for nationality.

Table 8.3.2 Logistic regression of nationality and vaccination coverages for DTPPolMMR for the number of doses at series 5505111, diphtheria at 5 doses, Hepatitis B at 1 and 3 doses, polio at 5 doses and measles at 1 dose for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio series 5505111 (±95%CI)		Coverage Di (5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)	
nationality of child	Swiss	6001	78.0	76.1 (74.4, 77.8)		ref	87.2 (86.0, 88.4)		ref
	Europe (EU + Norway)	599	9.7	73.0 (68.5, 77.4)	0.85	(0.66, 1.08)	82.6 (78.9, 86.4)	**0.70**	**(0.52, 0.93)**
	E. Europe, incl. Turkey	681	9.6	32.6 (26.4, 38.9)	**0.15**	**(0.11, 0.20)**	35.2 (29.3, 41.3)	**0.08**	**(0.06, 0.11)**
	Asia	57	1.0	44.2 (27.5, 60.9)	**0.25**	**(0.13, 0.49)**	44.2 (27.5, 60.9)	**0.12**	**(0.06, 0.23)**
	Others	118	1.7	36.0 (24.9, 47.1)	**0.18**	**(0.11, 0.29)**	39.2 (28.0, 50.4)	**0.09**	**(0.06, 0.15)**
variable		n	%	Coverage for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverage HepB(3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
nationality of child	Swiss	6001	78.0	39.9 (36.5, 43.3)		ref	24.0 (21.5, 26.4)		ref
	Europe (EU + Norway)	599	9.7	46.8 (41.5, 52.2)	**1.33**	**(1.06, 1.66)**	27.8 (23.0, 32.6)	1.22	(0.96, 1.55)
	E. Europe, incl. Turkey	681	9.6	45.0 (37.2, 52.8)	1.23	(0.89, 1.70)	28.3 (22.2, 34.4)	1.25	(0.93, 1.69)
	Asia	57	1.0	56.3 (39.4, 73.3)	1.94	(0.96, 3.93)	45.7 (29.4, 61.9)	**2.67**	**(1.37, 5.19)**
	Others	118	1.7	60.4 (49.5, 71.2)	**2.29**	**(1.45, 3.62)**	35.9 (25.2, 46.7)	**1.78**	**(1.12, 2.84)**
variable		n	%	Coverage Polio 5 doses) %(±95%CI)	Odds Ratio Polio (5 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
nationality of child	Swiss	6001	78.0	86.5 (85.0, 87.9)		ref	94.2 (93.5, 95.0)		ref
	Europe (EU + Norway)	599	9.7	79.9 (76.1, 83.8)	**0.62**	**(0.48, 0.82)**	92.3 (90.0, 94.6)	0.73	(0.51, 1.05)
	E. Europe, incl. Turkey	681	9.6	35.3 (29.0, 41.5)	**0.09**	**(0.06, 0.11)**	93.6 (91.1, 96.0)	0.87	(0.59, 1.33)
	Asia	57	1.0	44.2 (27.5, 60.9)	**0.12**	**(0.06, 0.25)**	92.1 (80.4, 103.7)	0.71	(0.14, 3.50)
	Others	118	1.7	40.9 (29.5, 52.3)	**0.11**	**(0.07, 0.18)**	90.7 (84.2, 97.2)	0.60	(0.28, 1.29)

CI: confidence interval. ref: reference group. JU, TI, VD: not included in analysis.

3.5 Vaccinating professionals

Question: By whom was your child vaccinated (More than one answer was possible.)

Table 9 displays the distribution of health professionals active in vaccinating children in the 3 age groups. 79.2% of all toddlers were vaccinated by their pediatricians, whereas only 21.5% by general practitioners (GPs). Combined, complementary / alternative medicine (CAM) practitioners and other health professionals contributed to approximately 3%. Pediatricians remain by far as the most cited health profesional to vaccinate children at school entry (71.3%), followed by GPs (40.6%) and school health personnel (12.8%) while CAM practitioner and others making up the last category at 4.1%. By children at school departure, the distribution of vaccinators is more evenly dispersed: 58.4% were the GPs, 60.4% were pediatricians, 47.5% were school health officials; 4.1% were vaccinated by other health professionals. When examining this distribution among the different linguistic regions, the same trends are observed, with pediatricians playing an even more apparent role by vaccination than the GPs in the French- and Italian-speaking regions compared to the German-speaking region for the two younger age groups. By the older schoolchildren, the differences are less apparent in the German-speaking region, but remains the same in the French-speaking region. Upon examination of this distribution of health professionals by cantons, it is noteworthy to see that in smaller cantons, such as in AR, GL, LU, OW and NW, the frequency of the toddlers being vaccinated by the GP and pediatrician is the same (Annexes I.1, I.2, I.3). AI is an exception where 85.9% of the vaccinators are GPs, and only 15.5% are pediatricians. By schoolchildren, vaccination policy and additional help of school or LL nurses become apparent. Parents living in cantons with additional help in the school health service or where the school doctors are permitted to vaccinate in the schools cited that their children were vaccinated by school officials much more often than those without these conditions.

Table 9. Distribution of health professionals who are active in vaccinating toddlers 24-35 months of age, and children at school entry and departure in Switzerland as perceived by parents, 1999-2003

	Toddlers							
	D-CH		W-CH		TI		CH	
n	5717		2150		532		8399	
	n	%	n	%	n	%	n	%
General practitioner	1785	25.9	230	10.7	16	3.3	2031	21.5
Pediatrician	3933	74.4	1931	91.1	508	95.3	6372	79.2
Complementary / alternative medicine practitioner	101	1.7	27	1.3	-	-	128	1.6
Others	27	0.9	39	2.6	8	1.5	74	1.4

	School entry					
	D-CH		W-CH		CH	
n	5178		1706		6884	
	n	%	n	%	n	%
General practitioner	2289	44.6	433	26.2	2722	40.6
Pediatrician	3511	68.3	1440	82.2	4951	71.3
Complementary / alternative medicine practitioner	76	1.5	36	2.7	112	1.7
School health personnel	483	9.6	436	24.2	919	12.8
Others	66	2.0	54	4.0	120	2.4

	School departure					
	D-CH		W-CH		CH	
n	4500		1814		6314	
	n	%	n	%	n	%
General practitioner	2863	64.1	744	37.9	3607	58.4
Pediatrician	2481	55.7	1403	77.6	3884	60.4
Complementary / alternative medicine practitioner	51	1.1	21	1.1	72	1.1
School health personnel	2161	45.9	1033	53.3	3194	47.5
Others	102	4.0	78	4.4	180	4.1

Multiple answers were possible.
BE, TI, VD: no information available for schoolchildren as questionnaire was not used.

3.6 Sources of information

Question: Have you received information regarding vaccination? If yes, are you happy with this information? From whom have you received this information? How would you like to be informed about vaccination? (More than one answer was possible.)

Having possession of information regarding vaccination also significantly influence vaccination coverage (Table 10). Of the 88.7% of the families of toddlers who claimed to have received information regarding vaccination, 66.9% are satisfied with the existing information, 21.2% are not satisfied, 4.8% did not know and 7.1% did not answer the question.

Table 10. Information status regarding vaccination as perceived by parents of toddlers 24-35 months of age and children at school entry and departure in the German-, French- and Italian-speaking regions of Switzerland, 1999-2003

			received		If yes (%).....			
Age groups	**Regions**	n	Info (%)	n	satisfied	not satisfied	do not know	no answer
Toddlers	German-speaking	5717	90.3	5274	67.5	19.9	4.7	7.8
	French-speaking	2150	84.1	1858	64.9	25.7	4.8	4.5
	Italian-speaking	532	89.2	477	67.6	15.6	5.9	10.9
	Switzerland	8399	88.7	7609	66.9	21.2	4.8	7.1
School entry	German-speaking	5178	90.3	4657	66.9	18.1	7.0	7.9
	French-speaking	1698	86.2	1482	67.3	16.7	5.9	10.1
	Switzerland	6876	91.8	6139	67.0	17.8	6.8	8.4
School departure	German-speaking	4499	86.3	3960	69.7	14.7	8.2	7.4
	French-speaking	1814	90.4	1649	68.7	14.5	8.1	8.7
	Switzerland	6313	87.2	5609	69.5	14.7	8.1	7.7

BE, TI, VD: no information available for schoolchildren as the questionnaire was not used.

When detailed into the different linguistic regions, parents of toddlers in the French-speaking region appear to be slightly more unsatisfied with the current information than parents in the other two regions; however when including those who did not answer, the difference between regions are no longer apparent. However, closer examination by cantons confirms that dissatisfaction is highest among parents in cantons VS, NE and FR. On the other hand, the canton of JU has the highest level of satisfaction (Annex J.1). Toddlers whose parents claimed to have received information regarding vaccination are significantly less likely to be vaccinated than those who have not received information (Table 11.1). The odds of being UTD at series 333331111 and measles at one dose

among toddlers whose parents have received information is 0.65 (CI: 0.51, 0.82) and 0.55 (CI: 0.40, 0.75), respectively, times that of those who have not received information. Among those who have received information, and are satisfied, 72.0% fit into this category; the other 28.0% were not satisfied or did not know how to respond. Among those who are satisfied with the information, 79.7% are UTD with the 33333111 immunization series and only 70.3% for those who are not satisfied; the odds of being UTD among those satisfied is 1.65 (CI: 1.39, 1.96) times that of those not satisfied or did not know. This pattern is also significantly observed with Di at 4 doses, Hib at 3 doses and measles at 1 dose.

The same pattern for information status is also observed by the schoolchildren, as shown in Table 10. 91.8% of the parents of children at school entry have received information regarding vaccination, and 87.2% of those at school departure. Of these families, 67.0% of the former group are satisfied with the current information, 17.8% are not satisfied, and 6.8% remained undecided and 8.4% did not answer the question. By children at school departure, it is 69.5%, 14.7%, 8.1% and 7.7%, respectively. The percentage of those not satisfied decreased as those who did not know or refrained from answering increased. This distribution of satisfaction/ dissatisfaction is similar throughout the different linguistic regions. Among the parents of children at school entry, those in canton OW displayed the least amount of satisfaction. The highest proportion of parents of schoolchildren who refrained from answering the question or who responded as did not know resided in canton AI (Annexes J.2, J.3). Similar to the toddlers, children at school entry whose parents have received information have lower coverage for measles at one dose than those where parents have not received information (Table 11.2). The odds of these children being UTD for 1 dose of measles is 0.64 (CI: 0.44, 0.94) times that of those who have not received information. Unlike the toddlers, children at school entry whose parents have received information are significantly better vaccinated for Di at 4 doses and Hib at 3 doses than those who have no information, with the odds being 1.88 (CI: 1.34, 2.64) and 1.47 (CI: 1.17, 1.85), respectively. Those who are satisfied with the information received are significantly better vaccinated for the 44443111 immunization series, Di, Pol and measles than those who are dissatisfied.

In contrast to the other two age groups, coverage for measles at one dose for children at school departure who have or have not received information regarding vaccination is not significantly different. However, children in this age group whose parents have received information are significantly better vaccinated than those with no information at the 5505111 series and for Di and Pol at 5 doses (Table 11.3). The odds of being UTD at series 5505111, 5 doses of Di and Pol among adolescents whose parents have information regarding vaccination are 1.88 (CI: 1.49, 2.37), 2.17 (CI: 1.72, 2.76), and 2.29 (CI: 1.78, 2.95), respectively, times that of those whose parents have no information or who were not sure of the information they received. Like the other two age groups, teenagers whose parents are satisfied with the information they have regarding vaccination are significantly better vaccinated than those whose parents are dissatisfied, with the highest odds of being UTD for measles at one dose. This trend is also seen with HepB, where having information about vaccination and satisfaction with the information received increase the chances of the adolescent being UTD for this vaccine, with the odds being 1.53 (CI: 1.25, 1.89) and 1.39 (CI: 1.08, 1.79), respectively, for HepB at one dose and 1.54 (CI: 1.30, 1.82) and 1.50 (CI: 1.25, 1.82), respectively, for HepB at 3 doses (Table 11.3.1).

Table 11.1. Logistic regression of various factors and vaccination coverage for DTPPolHibMMR for the number of doses at series 33333111, diphtheria at 3 doses, *Haemophilus influenzae* type B (Hib) at 3 doses, and measles at 1 dose for children 24-35 months of age living in Switzerland, 1999-2003

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	Coverage Di (3 doses) %(±95%CI)	Odds Ratio Di (3 doses) (±95%CI)
have information	no/don't know	790	11.3	83.9 (80.7, 87.0)	ref	95.8 (93.3, 98.4)	ref
about immunization	yes	7609	88.7	77.2 (75.6, 78.8)	**0.65 (0.51, 0.82)**	95.5 (94.8, 96.2)	0.93 (0.46, 1.85)
if yes, are you happy	no/don't know	1997	28.0	70.3 (67.3, 73.3)	ref	78.1 (75.7, 80.6)	ref
with the information	yes	5189	72.0	79.7 (77.9, 81.4)	**1.65 (1.39, 1.96)**	85.8 (84.3. 87.3)	**1.64 (1.20, 2.25)**
alternative	no	4341	58.3	84.7 (83.3, 86.2)	ref	97.8 (97.1, 98.5)	ref
medicine use	yes	3510	41.7	68.0 (65.5, 70.5)	**0.38 (0.33, 0.43)**	92.3 (90.9, 93.6)	**0.27 (0.18, 0.38)**
yes, alternative	German	2356	67.3	61.7 (58.8, 64.5)		90.3 (88.5, 92.0)	
medicine use	French	1144	32.7	81.0 (78.5, 83.5)	**2.66 (2.17, 3.25)**	96.3 (95.0, 97.7)	**2.83 (1.84, 4.37)**
language of region	German	5755	70.8	74.6 (72.8, 76.3)	ref	94.5 (93.7, 95.4)	ref
	French	2290	26.8	86.0 (84.4, 87.6)	**2.10 (1.78, 2.47)**	97.5 (96.7, 98.3)	**2.24 (1.57, 3.19)**
	Italian	684	2.4	90.7 (88.6, 92.8)	**3.33 (2.56, 4.34)**	98.5 (97.3, 99.6)	**3.72 (1.70, 8.14)**

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)	Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)
have information	no/don't know	790	11.3	93.7 (91.1, 96.3)	ref	88.8 (85.9, 91.8)	ref
about immunization	yes	7609	88.7	90.9 (90.0, 91.9)	0.67 (0.43, 1.05)	81.4 (79.9, 82.8)	**0.55 (0.40, 0.75)**
if yes, are you happy	no/don't know	1997	28.0	88.2 (86.2, 90.2)	ref	74.3 (71.5, 77.2)	ref
with the information	yes	5189	72.0	91.8 (90.5, 93.1)	**1.50 (1.14, 1.98)**	83.8 (82.2, 85.4)	**1.79 (1.50, 2.13)**
alternative	no	4341	58.3	95.0 (93.8, 96.2)	ref	89.2 (87.8, 90.5)	ref
medicine use	yes	3510	41.7	85.8 (84.0, 87.7)	**0.32 (0.24, 0.43)**	72.0 (69.5, 74.5)	**0.31 (0.26, 0.37)**
yes, alternative	German	2356	67.3	83.2 (80.8, 85.6)	ref	65.9 (63.2, 68.7)	ref
medicine use	French	1144	32.7	91.2 (89.2, 93.2)	**2.09 (1.54, 2.84)**	84.6 (82.1, 87.0)	**2.83 (2.26, 3.53)**
speaking regions	German	5755	70.8	90.1 (89.0, 91.2)	ref	79.0 (77.4, 80.6)	ref
	French	2290	26.8	93.4 (92.1, 94.8)	**1.57 (1.22, 2.01)**	90.1 (88.6, 91.5)	**2.41 (1.99, 2.92)**
	Italian	684	2.4	96.0 (94.5, 97.5)	**2.62 (1.75, 3.92)**	93.7 (92.0, 95.4)	**3.96 (2.90, 5.40)**

CI: confidence interval. ref: reference group. TI: not included in analysis for alternative medicine use.

Table 11.2. Logistic regression of various factors and vaccination coverage for DTPPolHibMMR for the number of doses at series 44443111, diphtheria at 4 doses, *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children at school entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)	
have information	no/don't know	713	10.6	42.6 (38.2, 47.0)		ref	87.8 (84.5, 91.0)		ref
about immunization	yes	5862	89.4	46.7 (44.7, 48.7)	1.18	(0.98, 1.42)	93.1 (92.1, 94.1)	**1.88**	**(1.34, 2.64)**
if yes, are you happy	no/don't know	1507	26.9	44.9 (41.5, 48.3)		ref	91.1 (89.4, 92.9)		ref
with the information	yes	3935	73.1	50.0 (47.6, 52.3)	**1.22**	**(1.05, 1.43)**	94.1 (93.1, 95.1)	**1.55**	**(1.18, 2.03)**
alternative	no	4091	62.3	49.9 (47.5, 52.2)		ref	93.3 (92.2, 94.5)		ref
medicine use	yes	2476	37.7	40.3 (37.6, 43.0)	**0.67**	**(0.59, 0.77)**	91.2 (89.6, 92.8)	**0.74**	**(0.57, 0.95)**
yes, alternative	German	1787	73.6	39.5 (36.4, 42.5)		ref	91.6 (89.7, 93.6)		ref
medicine use	French	689	26.4	42.6 (37.5, 47.8)	1.14	(0.89, 1.46)	89.8 (87.3, 92.4)	0.81	(0.55, 1.18)
language of region	German	6337	72.2	44.8 (42.9, 46.7)		ref	92.5 (91.6, 93.5)		ref
	French	2022	24.0	56.9 (53.2, 60.6)	**1.62**	**(1.37, 1.92)**	91.8 (90.3, 93.4)	0.91	(0.71, 1.16)
	Italian	793	3.8	83.9 (80.5, 87.2)	**6.40**	**(4.95, 8.28)**	95.2 (93.6, 96.8)	**1.60**	**(1.10, 2.34)**

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
have information	no/don't know	737	10.6	72.6 (68.4, 76.7)		ref	92.3 (89.7, 94.8)		ref
about immunization	yes	6139	89.4	79.5 (77.9, 81.1)	**1.47**	**(1.17, 1.85)**	88.4 (87.2, 89.6)	**0.64**	**(0.44, 0.94)**
if yes, are you happy	no/don't know	1575	26.9	78.4 (75.5, 81.3)		ref	81.6 (79.0, 84.2)		ref
with the information	yes	4143	73.1	81.5 (79.6, 83.3)	1.21	(0.98, 1.49)	91.0 (89.7, 92.3)	**2.28**	**(1.81, 2.88)**
alternative	no	4223	62.3	80.3 (78.4, 82.1)		ref	93.5 (92.5, 94.5)		ref
medicine use	yes	2653	37.7	76.3 (74.0, 78.7)	**0.79**	**(0.67, 0.94)**	81.0 (78.8, 83.1)	**0.30**	**(0.24, 0.36)**
yes, alternative	German	1787	73.6	77.6 (74.9, 80.3)		ref	79.5 (77.1, 82.0)		ref
medicine use	French	689	26.4	72.8 (68.4, 77.3)	0.77	(0.59, 1.02)	85.0 (80.3, 89.7)	1.46	(0.98, 2.16)
speaking regions	German	6337	72.2	77.8 (76.3, 79.3)		ref	87.4 (86.2, 88.7)		ref
	French	2323	24.0	77.7 (75.1, 80.2)	0.99	(0.83, 1.18)	90.6 (88.8, 92.4)	**1.39**	**(1.09, 1.76)**
	Italian	793	3.8	91.0 (88.4, 93.6)	**1.19**	**(1.05, 1.35)**	93.8 (91.6, 96.0)	**2.17**	**(1.46, 3.23)**

CI: confidence interval. ref: reference group. BE, TI, VD: only included in analysis for school vaccination policy. JU: not included in analysis.

Table 11.3. Logistic regression of various factors and vaccination coverage for DTPPolMMR for the number of doses at series 5505111, diphtheria at 5 doses, polio at 5 doses and measles at 1 dose for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio 5505111 (±95%CI)		Coverage Di (5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)	
have information	no/don't know	669	12.8	59.4 (53.9, 64.8)		ref	67.3 (62.0, 72.7)		ref
about immunization	yes	5228	87.2	75.2 (71.3, 75.3)	**1.88**	**(1.49, 2.37)**	81.8 (80.0, 83.5)	**2.17**	**(1.72, 2.76)**
if yes, are you happy	no/don't know	1238	24.6	69.2 (66.0, 72.5)		ref	79.1 (76.3, 82.0)		ref
with the information	yes	3662	75.4	75.2 (73.1, 77.3)	**1.35**	**(1.15, 1.58)**	83.3 (81.4, 85.2)	**1.31**	**(1.07, 1.61)**
alternative	no	4086	69.3	71.8 (69.4, 74.3)		ref	78.8 (76.4, 81.3)		ref
medicine use	yes	1811	30.7	70.8 (67.9, 73.8)	0.95	(0.80, 1.13)	82.4 (80.2, 84.5)	**1.26**	**(1.06, 1.56)**
yes, alternative	German	1203	71.8	72.7 (69.0, 76.5)		ref	84.3 (81.7, 87.0)		ref
medicine use	French	608	28.2	66.0 (61.8, 70.2)	**0.73**	**(0.56, 0.95)**	77.4 (74.1, 80.7)	**0.64**	**(0.48, 0.84)**
language of region	German	6072	70.1	72.0 (69.9, 74.0)		ref	81.9 (79.9, 83.9)		ref
	French	2324	25.0	71.8 (69.5, 74 0)	0.99	(0.85, 1.15)	80.5 (78.6, 82.4)	0.91	(0.76, 1.09)
	Italian	686	39.8	75.9 (72.6, 79.2)	1.23	(1.00, 1.51)	84.0 (81.5, 86.5)	1.16	(0.92, 1.46)

variable		n	%	Coverage for Pol (5 doses) %(±95%CI)	Odds Ratio Pol (5 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
have information	no/don't know	669	12.8	64.9 (59.3, 70.6)		ref	93.4 (91.0, 95.9)		ref
about immunization	yes	5228	87.2	80.9 (79.0, 82.8)	**2.29**	**(1.78, 2.95)**	94.5 (93.7, 95.3)	1.20	(0.79, 1.85)
if yes, are you happy	no/don't know	1238	24.6	77.0 (74.2, 80.1)		ref	91.2 (89.4, 93.0)		ref
with the information	yes	3662	75.4	82.2 (80.3, 84.2)	**1.38**	**(1.15, 1.66)**	95.5 (94.7, 96.3)	**2.05**	**(1.54, 2.72)**
alternative	no	4086	69.3	77.6 (75.2, 80.0)		ref	95.9 (95.1, 96.7)		ref
medicine use	yes	1811	30.7	81.7 (79.3, 84.1)	**1.29**	**(1.06, 1.56)**	90.8 (89.1, 92.5)	**0.42**	**(0.31, 0.57)**
yes, alternative	German	1203	71.8	81.9 (78.9, 84.9)		ref	92.0 (90.0, 93.9)		ref
medicine use	French	608	28.2	81.1 (77.4, 84.9)	0.95	(0.69, 1.31)	87.9 (84.7, 91.0)	**0.63**	**(0.42, 0.94)**
speaking regions	German	6072	70.1	79.7 (77.7, 81.8)		ref	94.7 (93.9, 95.4)		ref
	French	2324	25.0	83.4 (81.5, 85.3)	**1.28**	**(1.06, 1.54)**	91.7 (90.5, 92.9)	**0.62**	**(0.50, 0.77)**
	Italian	686	39.8	81.8 (78.7, 84.9)	1.14	(0.90, 1.46)	91.2 (89.5, 93.0)	**0.59**	**(0.45, 0.77)**

CI: confidence interval. ref: reference group. BE, TI, VD: only included in analysis for school vaccination policy. JU: not included in analysis.

Table 11.3.1 Logistic regression of various factors and vaccination coverage for Hepatitis B (HepB) at one dose and three doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverages for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverages for HepB (3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
have information	no/don't know	669	12.8	32.6 (27.8, 37.5)		ref	18.8 (14.7, 22.9)		ref
about immunization	yes	5228	87.2	42.6 (38.7, 46.5)	**1.53**	**(1.25, 1.89)**	24.3 (21.6, 27.1)	**1.39**	**(1.08, 1.79)**
if yes, are you happy	no/don't know	1238	24.6	35.8 (31.2, 40.4)		ref	19.5 (16.0, 23.0)		ref
with the information	yes	3662	75.4	46.2 (42.0, 50.3)	**1.54**	**(1.30, 1.82)**	26.7 (23.7, 29.8)	**1.50**	**(1.25, 1.82)**
alternative	no	4086	69.3	44.7 (40.7, 48.6)		ref	25.7 (22.6, 28.8)		ref
medicine use	yes	1811	30.7	33.9 (29.5, 38.2)	**0.64**	**(0.54, 0.75)**	19.0 (16.2, 21.9)	**0.68**	**(0.56, 0.82)**
yes, alternative	German	1203	71.8	29.2 (23.8, 34.6)			13.1 (10.1, 16.1)		
medicine use	French	608	28.2	45.9 (40.2, 51.5)	**2.06**	**(1.45, 2.91)**	34.1 (28.7, 39.6)	**3.44**	**(2.41, 4.93)**
language of region	German	6072	70.1	38.7 (35.0, 42.3)		ref	21.7 (19.0, 24.4)		ref
	French	2324	25.0	64.3 (60.9, 67.7)	**2.86**	**(2.31, 3.54)**	32.2 (28.7, 35.7)	**1.71**	**(1.37, 2.15)**
	Italian	686	39.8	70.4 (65.5, 75.3)	**3.77**	**(2.85, 5.00)**	60.9 (55.4, 66.4)	**5.62**	**(4.25, 7.44)**

CI: confidence interval. ref: reference group. BE, TI, VD: only included in analysis for school vaccination policy. JU: not included in analysis.

Of the information available, the top 3 resources for information regarding vaccination for all 3 age groups include information from the doctors upon request, followed by information brochures, and obtaining the information from their physicians without it being requested. In the future, parents would like to receive more information from the doctors, instead of having to ask the doctors themselves (Table 12, Annex K). They would like less information from the media, but more from the health insurance. Among the different language regions, the same trend is observed for the type of information available and what they wish to receive in the future. The two major differences are the information from public health facilities and the active seeking of information. More precisely, parents in all regions for the 2 youngest age groups prefer information to be given to them freely by the physicians; by the adolescents, the same trend is observed in the German-speaking region, but the difference is not apparent, either by the French-speaking region or by the overall mean. Parents in the German-speaking region significantly receive more information from the public health facilities than those in the French- and Italian-speaking regions. Parents of toddlers generally would like more information from public health services, whereas the trend is reversed for those in the school age groups. Finally, more parents recognize the increase in information from school health

official as their children are older; consequently, they would like this flow of information to also increase in the future.

Table 12. Sources for information regarding vaccination (%) for parents of children in Switzerland, 1999-2003

	Toddlers							
n	D-CH 5717		W-CH 2150		TI 532		CH 8399	
	present	future	present	future	present	future	present	future
Information broshures	47.8	65.4	36.4	60.4	38.3	55.5	44.6	63.9
Doctor upon request	50.8	41.0	44.4	42.1	56.2	39.6	49.2	41.3
Doctor without request	36.0	65.3	36.6	63.7	40.9	61.2	36.2	64.8
School doctor	1.7	11.1	2.0	15.1	-	23.6	1.8	12.4
The media	38.2	33.7	30.5	25.8	27.6	20.8	36.0	31.4
Public health services	26.0	32.0	10.4	17.2	8.5	3.4	21.6	27.6
Health insurance	2.3	17.1	2.2	14.8	1.8	12.9	2.3	16.4
Job / Education	9.8	2.7	9.3	2.4	11.6	9.6	9.7	2.7
Other resources	14.1	9.4	10.3	8.0	5.4	0.8	13.0	8.5

	School entry					
n	D-CH 5178		W-CH 1695		CH 6873	
	present	future	present	future	present	future
Information broshures	41.4	61.1	34.7	53.1	39.9	59.4
Doctor upon request	50.6	37.4	45.1	45.9	49.4	39.2
Doctor without request	34.9	58.1	41.4	54.8	36.3	57.4
School doctor	8.4	24.0	12.5	26.4	9.3	24.5
The media	37.9	29.6	30.5	23.0	36.3	28.2
Public health services	23.4	22.3	14.7	12.7	21.6	20.2
Health insurance	2.8	17.5	1.8	12.0	2.6	16.3
Job / Education	9.0	2.4	9.8	2.9	9.2	2.5
Other resources	10.9	5.8	11.3	6.4	11.0	5.9

	School departure					
n	D-CH 4499		W-CH 1814		CH 6313	
	present	future	present	future	present	future
Information broshures	37.1	56.4	44.3	54.3	38.6	56.0
Doctor upon request	42.4	38.5	45.7	48.5	43.1	40.7
Doctor without request	29.9	47.8	29.4	44.5	29.8	47.1
School doctor	23.8	31.6	25.8	33.9	24.2	32.1
The media	31.3	27.7	35.0	27.8	32.1	27.8
Public health services	20.7	16.5	11.3	9.3	18.7	14.9
Health insurance	3.3	18.0	2.4	12.9	3.1	16.9
Job / Education	9.4	4.5	8.0	3.4	9.1	4.3
Other resources	9.6	7.2	13.1	7.8	10.4	7.4

Multiple answers were possible. BE, TI, VD: questionnaires were not used with schoolchildren.
D-CH: German-speaking region. W-CH: French-speaking region.

3.7 Use of complementary / alternative medicine (CAM)

Question: Have you ever used any form of alternative medicine for your child?

In Switzerland, 41.7% of families of toddlers use some form of CAM, with a steady decrease as the children are older, down to 37.9% at school entry and to 30.9% at school departure (Table 13).

Table 13. Distribution of use of CAM among parents of toddlers 24-35 month of age and children at school entry and departure in the German- and French- speaking regions of Switzerland, 1999-2003

Age groups	Regions	Alternative medicine use			
		n	Yes (%)	No (%)	No Answer (%)
Toddlers	German-speaking	5701	38.2	58.4	3.5
	French-speaking	2150	51.4	44.5	4.1
	Switzerland	7851	41.7	54.7	3.6
School entry	German-speaking	5178	34.9	60.9	4.3
	French-speaking	1698	49.0	46.7	4.3
	Switzerland	6876	37.9	57.8	4.3
School departure	German-speaking	4499	27.8	70.7	1.5
	French-speaking	1814	42.2	55.3	2.5
	Switzerland	6313	30.9	67.4	1.7

TI: by toddlers, no information since the theme of alternative medicine was not included in the questionnaire. BE, TI, VD: no information for schoolchildren since questionnaire was not used.

More specifically, parents in the French-speaking region utilize CAM much more than their German counterpart, although the pattern of decrease use of CAM with increasing age remains the same. In all three age groups, the most frequently reported use of CAM are in the French-speaking cantons, with the exception of canton OW, where 56.5% of parents of toddlers admitted to using some form of CAM (Annex L). When examining the use of CAM against immunization coverage, it appears to be consistently associated with vaccination rates. Toddlers of parents who use CAM have a lower chance of being UTD. For the 33333111 series, the odds of being UTD among these toddlers is 0.38 (CI: 0.33, 0.43) times that of those where the parents do not use CAM. Further investigation into the individual vaccines for both toddlers and children at school entry reveal the same pattern (Tables 11.1, 11.2). This pattern is also found among the children at school departure for measles at

one dose and HepB at one dose and at 3 doses, but for Di and Pol at 5 doses, the trend is reversed (Tables 11.3, 11.3.1). Here, adolescents whose parents use CAM are better vaccinated than those whose parents do not practice CAM. The odds of being UTD for 5 doses of Di and Pol among teenagers whose parents use CAM is 1.26 (CI: 1.06, 1.56) and 1.29 (CI: 1.06, 1.56), respectively, times that of those whose parents do not use CAM.

For toddlers and children at school departure whose parents use CAM, a significant difference could be found in coverage levels between those residing in the French- and German-speaking regions (Tables 11.1, 11.3). The odds of being UTD for toddlers from the French-speaking region at the 33333111 DTPPolHibMMR series, 3 doses of Di and Hib, and 1 dose of measles is 2.66 (CI: 2.17, 3.25), 2.83 (CI: 1.84, 4.37), 2.09 (CI: 1.54, 2.84) and 2.83 (CI: 2.26, 3.53), respectively, times that of those from the German-speaking region. In contrast, the odds that adolescents from the French-speaking region are UTD with the 5550111 DTPPolHibMMR series, 5 doses of Di and 1 dose of measles is 0.73 (CI: 0.56, 0.95), 0.64 (CI: 0.48, 0.84) and 0.63 (CI: 0.42, 0.94), respectively, times that of those from the German-speaking region; for 1 dose and 3 doses of HepB, the odds of being UTD are 2.06 (CI: 1.45, 2.91) and 3.44 (CI: 2.41, 4.93), respectively (Table 11.3.1). There was no significant difference in CAM use between the linguistic regions for the children at school entry, as seen in Table 11.2.

3.8 Linguistic region

Almost as pronounced as the use of alternative medicine is the influence of the different linguistic regions on vaccination coverage. The general trend for the two younger age groups shows that those children from the German-speaking regions are significantly less vaccinated, followed by the French-speaking region, and finally the Italian-speaking region has the highest immunization coverage, with the trend being less distinct as the age of the children climbs (Tables 11.1, 11.2). Only 74.6% of toddlers residing in the German-speaking region have completed the vaccination series 33333111 in comparison to 86.0% of those residing in the French-speaking region and 90.7% in the Italian-speaking region. The odds of being UTD for the 33333111 series among those toddlers in the French-and Italian-speaking regions are 2.10 (CI: 1.78, 2.47) and 3.33 (CI: 2.56, 4.34), respectively, times that of those in the German-speaking region. By Di and Hib at 3 doses, this pattern is also significantly similar. For measles at one dose, the odds is even higher at 2.41 (CI: 1.99, 2.92) for the French-speaking region, and 3.96 (CI: 2.90, 5.40) for the Italian-speaking region to be UTD, as compared to their German counterparts. This trend is also apparent for children at school entry, with the odds of being UTD for series 44443111 and measles at 1 dose for the French-speaking region are 1.62 (CI: 1.37, 1.92) and 1.39 (CI: 1.09, 1.76), respectively, and for the Italian-speaking region are 6.40 (CI: 4.95, 8.28) and 2.17 (CI: 1.46, 3.23), respectively, times that of those from the German-speaking region. By 4 doses of Di and 3 doses of Hib, the odds that children from the Italian-speaking region are UTD are 1.60 (CI: 1.10, 2.34) and 1.19 (CI: 1.05, 1.35), respectively, times that of those residing in the German-speaking region.

This pattern is not so distinct in the oldest age group as displayed in Table 11.3. By the 5505111 series and Di at 5 doses, coverage levels for the children in the German- and French-speaking regions are similar, but they are lower than those in the Italian-speaking region; by Pol, coverage in the German- and Italian-speaking regions are similar, but significantly lower than the French-speaking region; for measles at one dose, children from the French- and Italian-speaking regions, 91.7% and 91.5%, respectively, are significantly less vaccinated than those from the German-

speaking region (94.7%). The odds of being UTD for measles at one dose for among adolescents living in the French- speaking region is 0.62 (CI: 0.50, 0.77) times that of those in the German-speaking region; for the Italian-speaking region, the odds is 0.59 (CI: 0.45, 0.77) times. In contrast to measles, adolescents in the French-and Italian-speaking regions have significantly higher chances of being vaccinated for HepB than those children in the German-speaking region (Table 11.3.1). The odds of being UTD for HepB at one dose among those living in the French-speaking region is 2.86 (CI: 2.31, 3.54) times that of those living in the German-speaking region; for the Italian speaking region, the odds is 3.77 (CI: 2.85, 5.00) times.

3.9 School vaccination policy

Vaccination coverage in schoolchildren was also examined against school immunization policy. Cantons with cantonal employed school or LL nurses supplementing school health services (AG, BL, BS, GE, NW, SZ, VD and VS) have overall significantly higher vaccination coverage by the immunization series than those without these services for both age groups, with coverage estimates for children at school entry being 59.3% and 44.0%, respectively, for the 44443111 DTPPolHibMMR series and for school departure, 75.7% and 70.0%, respectively, for the 5505111 DTPPolMMR series (Tables 14.1, 14.2). The odds of being UTD for the 44443111 series for children at school entry in cantons with these services is 1.86 (CI: 1.61, 2.14) times that of those in cantons where there are no supplementary school health nurses; by the adolescents, the odds is 1.33 (CI: 1.14, 1.55) at the 5505111 immunization series. For measles at one dose, coverage is significantly higher for children at school entry in cantons with these services, whereby they do not influence coverage by the adolescents. However, by the children at school departure, the odds of being UTD for Pol at 5 doses and HepB at 1 dose for children in cantons with additional school health nurses is 1.46 (CI: 1.20, 1.76) and 1.66 (CI: 1.33, 2.08), respectively, times that of those residing in cantons without the extra help (Tables 14.2, 14.2.1). Further analyses of the services with the additional nurses against higher doses for the recommended vaccines (i.e. for school entry, 5 doses for Di and Pol, 4 doses for Hib; for school departure, DTPPolMMR immunization series at 6605111 and 5505222, 6 doses for Di and 2 doses for measles) as displayed in Tables 14.1 and

14.2 show that children in cantons where the additional nurses are available have a significantly better chance of being vaccinated than those living in cantons where they rely solely on the school doctors for school health services.

In contrast to additional help from school / LL nurses, the policy in which immunization is permitted in the schools is not significantly associated with vaccination coverage by the adolescents; however, when analyzed against higher doses, children where vaccination is permitted in the schools do have a significantly higher chance of being vaccinated than those living in cantons where immunization is done privately by the GPs (Table 14.2). At 5 doses of Di, 1 dose of measles and immunization series 5505111, the differences in vaccination coverage levels are not significant, whereas at 6 doses of Di, 2 doses of measles and the immunization series 6605111, the odds of being UTD among adolescents living in cantons where vaccination is permitted in the schools are significantly higher at 1.32 (CI: 1.12, 1.56), 1.39 (CI: 1.16, 1.66), and 1.22 (CI: 1.04, 1.44), respectively, than those where it is not possible to vaccinate in the schools. There is no significant difference in HepB coverage among the cantons with and without HepB campaign in the schools. There is however a significant association between the odds of being UTD for 3 doses of HepB and whether or not HepB vaccination is permitted in the schools. Adolescents residing in cantons where HepB vaccination is administered in the schools have an odds of being UTD at 3 doses of HepB of 0.58 (CI: 0.46, 0.71) times that of adolescents living in cantons where HepB vaccination is not offered during school hours (Table 14.2.1).

Association between vaccination status of children at school entry and the factor of residing in cantons where vaccination is permitted in the schools depends on the vaccine. At 5 doses of Di and Pol, children living in cantons where vaccination is permitted in school have a significantly higher chance of being vaccinated than children living in cantons where immunizations are done privately, with the odds at 1.99 (CI: 1.73, 2.28) and 2.10 (CI: 1.83, 2.41), respectively (Table 14.1). In contrast, by the 44443111 immunization series and Hib, at 3 and 4 doses, children at school entry living in cantons where they can be vaccinated by school health officials have lower immunization

coverage than compared to those living in cantons where vaccination is encouraged to be administered by the family physicians. 47.8% of children in cantons belonging to the former group is UTD for the 44443111 series as compared to 53.4% in the latter group; it is 76.9% and 82.3%, respectively for Hib at 3 doses and 23.9% and 33.3%, respectively, at 4 doses (Table 14.1). The odds of being UTD for the series 44443111 for children at school entry residing in cantons where immunization is permitted in the schools is 0.80 (CI: 0.70, 0.91) times that of those where immunization is not permitted; for Hib at 3 doses, the odds is 0.72 (CI: 0.61, 0.84) and at 4 doses it is 0.63 (CI: 0.54, 0.74).

Table 14.1. Logistic regression of school vaccination policy and vaccination coverage for DTPolHibMMR for the number of doses at series 44443111 and 33333111, diphtheria at 4 and 5 doses, Haemophilus influenzae type B (Hib) at 3 and 4 doses, polio at 5 doses and measles at one dose for children at school entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)	Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)
cantonally employed	no	5710	65.8	44.0 (42.0, 46.0)	ref	92.5 (91.4, 93.5)	ref
school health nurses	yes	3434	34.2	59.3 (56.5, 62.1)	**1.86 (1.61, 2.14)**	92.5 (91.4, 93.5)	1.00 (0.81, 1.24)
vaccination in school	no	3145	25.2	53.4 (50.8, 56.0)	ref	91.9 (90.6, 93.1)	ref
	yes	5999	74.8	47.8 (45.7, 49.9)	**0.80 (0.70, 0.91)**	92.7 (91.7, 93.6)	1.12 (0.90, 1.39)

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio series 3333111 (±95%CI)	Coverage Di (5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)
cantonally employed	no	5710	65.8	67.5 (65.6, 69.4)	ref	57.7 (55.2, 60.1)	ref
school health nurses	yes	3434	34.2	72.5 (70.4, 74.5)	**1.27 (1.11, 1.45)**	64.4, (62.1, 66.7)	**1.33 (1.15, 1.53)**
vaccination in school	no	3145	25.2	71.2 (69.0, 73.4)	ref	47.4 (44.9, 50.0)	ref
	yes	5999	74.8	68.5 (66.7, 70.3)	0.88 (0.77, 1.01)	64.2 (62.0, 66.4)	**1.99 (1.73, 2.28)**

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)	Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)
cantonally employed	no	5710	65.8	77.6 (75.9, 79.3)	ref	87.6 (86.2, 88.9)	ref
school health nurses	yes	3434	34.2	79.7 (77.9, 81.4)	1.13 (0.98, 1.31)	90.1 (88.8, 91.4)	**1.30 (1.07, 1.57)**
vaccination in school	no	3145	25.2	82.3 (80.4, 84.2)	ref	89.0 (87.6, 90.5)	ref
	yes	5999	74.8	76.9 (75.4, 78.5)	**0.72 (0.61, 0.84)**	88.2 (87.0, 89.5)	0.92 (0.76, 1.11)

variable		n	%	Coverage Hib (4 doses) %(±95%CI)	Odds Ratio Hib (4 doses) (±95%CI)	Coverage Pol (5 doses) %(±95%CI)	Odds Ratio Pol (5 doses) (±95%CI)
cantonally employed	no	5710	65.8	26.4 (24.4, 28.4)	ref	56.5 (53.9, 59.0)	ref
school health nurses	yes	3434	34.2	26.9 (24.2, 29.6)	1.03 (0.87, 1.22)	65.7 (63.5, 67.8)	**1.47 (1.28, 1.70)**
vaccination in school	no	3145	25.2	33.3 (30.7, 35.9)	ref	46.0 (43.6, 48,5)	ref
	yes	5999	74.8	23.9 (21.9, 25.9)	**0.63 (0.54, 0.74)**	64.2 (61.9, 66.4)	**2.10 (1.83, 2.41)**

CI: confidence interval. ref: reference group. JU: not included in analysis

Table 14.2. Logistic regression of school vaccination policy and vaccination coverage for DTPPolMMR for the number of doses at series 6605111, 5505222 and 5505111, diphtheria at 5 and 6 doses, polio at 5 doses and measles at 1 and 2 doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio 5505111 (±95%CI)	Coverage Di (5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)
cantonally employed	no	5503	64.2	70.0 (67.8, 72.3)	ref	80.7 (78.6, 82.8)	ref
school health nurses	yes	3579	35.8	75.7 (73.7, 77.7)	**1.33 (1.14, 1.55)**	83.2 (81.3, 85.1)	1.18 (0.98, 1.43)
vaccination in school	no	2747	22.6	74.4 (71.7, 77.0)	ref	82.2 (79.8, 84.7)	ref
	yes	6335	77.4	71.4 (69.5, 73.3)	0.86 (0.73, 1.02)	81.4 (79.6, 83.3)	0.95 (0.77, 1.16)

variable		n	%	Coverage for series 6605111 %(±95%CI)	Odds Ratio 6605111 (±95%CI)	Coverage series 5505222 %(±95%CI)	Odds Ratio 5505222 (±95%CI)
cantonally employed	no	5503	64.2	42.0 (39.0, 45.0)	ref	36.1 (33.2, 38.9)	ref
school health nurses	yes	3579	35.8	56.4 (53.9, 58.9)	**1.79 (1.53, 2.10)**	56.0 (53.8, 58.2)	**2.26 (1.94, 2.62)**
vaccination in school	no	2747	22.6	43.3 (40.2, 46.3)	ref	41.6 (38.5, 44.8)	ref
	yes	6335	77.4	48.3 (45.8, 50.8)	**1.22 (1.04, 1.44)**	43.7 (41.3, 46.1)	1.09 (0.92, 1.28)

variable		n	%	Coverage for Pol (5 doses) %(±95%CI)	Odds Ratio Pol (5 doses) (±95%CI)	Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)
cantonally employed	no	5503	64.2	78.7 (76.5, 80.9)	ref	93.4 (92.5, 94.2)	ref
school health nurses	yes	3579	35.8	84.3 (82.5, 86.1)	**1.46 (1.20, 1.76)**	94.5 (93.7, 95.4)	1.23 (0.99, 1.53)
vaccination in school	no	2747	22.6	79.7 (77.0, 82.3)	ref	93.7 (92.5, 94.9)	ref
	yes	6335	77.4	81.1 (79.3, 82.9)	1.10 (0.89, 1.33)	93.8 (93.1, 94.5)	1.02 (0.80, 1.29)

variable		n	%	Coverage for Di (6 doses) %(±95%CI)	Odds Ratio Di (6 doses) (±95%CI)	Coverage Measles (2 doses) %(±95%CI)	Odds Ratio Measles (2 doses) (±95%CI)
cantonally employed	no	5503	64.2	46.7 (43.5, 50.0)	ref	47.5 (44.4, 50.7)	ref
school health nurses	yes	3579	35.8	59.8 (57.4, 62.3)	**1.70 (1.44, 2.01)**	65.5 (63.2, 67.9)	**2.10 (1.78, 2.47)**
vaccination in school	no	2747	22.6	46.1 (42.9, 49.2)	ref	47.6 (44.1, 51.2)	ref
	yes	6335	77.4	53.0 (50.3, 55.7)	**1.32 (1.12, 1.56)**	55.8 (53.2, 58.5)	**1.39 (1.16, 1.66)**

CI: confidence interval. ref: reference group. JU: not included in analysis

Table 14.2.1. Logistic regression of Hepatitis B (HepB) vaccination policy in the schools and vaccination coverage for HepB at one dose and three doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverage for HepB (3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
cantonally employed	no	5503	64.2	41.8 (38.3, 45.4)		ref	27.0 (24.2, 29.7)		ref
school health nurses	yes	3579	35.8	54.4 (50.2, 58.7)	**1.66**	**(1.33, 2.08)**	24.0 (20.8, 27.2)	0.86	(0.68, 1.07)
HepB campaign in	no	2634	19.6	50.7 (43.7, 57.8)		ref	21.9 (17.0, 26.7)		ref
the schools	yes	6448	80.4	45.3 (42.3, 48.3)	0.80	(0.59, 1.09)	26.9 (24.6, 29.2)	1.31	(0.97, 1.78)
HepB vaccination in	no	2587	19.5	43.3 (39.3, 47.3)		ref	35.1 (31.3, 38.8)		ref
the schools	yes	6495	80.5	47.1 (43.8. 50.4)	1.16	(0.95, 1.44)	23.7 (21.2, 26.2)	**0.58**	**(0.46, 0.71)**

CI: confidence interval. ref: reference group. JU: not included in analysis

3.10 Attitudes towards vaccination

Parents were asked if they strongly agreed, agreed, or disagree with these six statements regarding vaccination in general:

1. *I follow the doctor's recommendations regarding vaccination.*
2. *There is too much social pressure to vaccinate children.*
3. *I believe that vaccination protects from certain diseases.*
4. *As many children as possible should be vaccinated so that all children will be protected from complications associated with certain diseases.*
5. *Doctors provide enough information on childhood immunization.*
6. *I am concerned about possible side effects from vaccines.*

Parental attitudes toward vaccination in general are also strongly associated with immunization coverage, with the same trend revealed for all six statements described above (Tables 15). These six statements posed on the questionnaire dealt with following the doctor's recommendations, social pressure to vaccinate, effectiveness of vaccination, importance of solidarity, explanation of doctors, and concerns regarding possible side effects. By parents of toddlers, 89.9% parents agree or

strongly agree that they follow the recommendations of the physicians, 58.0% disagree that there is too much social pressure in society, 96.7% believe in the effectiveness of vaccination, 78.8% would vaccinate their children for the benefit of all kids, 64.0% agree or strongly agree that doctors provide enough information about vaccination, and 55.7% of the parents are concerned with possible side effects (Table 15.1). In short, toddlers whose parents follow the recommendations of their doctors, believe in the effectiveness of vaccination, concur with the advantage of herd immunity and agree that doctors provide enough explanations about vaccination are better vaccinated than those whose parents do not agree with these statements. In contrast, toddlers whose parents thought there were too much social pressure to vaccinate their children and have concerns about possible side effects from vaccines are less likely to be vaccinated as compared to those who disagree. Most pronounced are the responses to following the doctor's recommendations and the effectiveness of vaccination where the odds of being UTD for measles at 1 dose among those who strongly agree with these statements are 42.70 (CI: 31.88, 57.17) and 22.25 (CI: 13.74, 36.06) times, respectively, that of those who disagree. In contrast, the odds of being UTD for measles at 1 dose among those who strongly agree that there is too much pressure to vaccinate their children and are concerned about side effects from vaccination are 0.08 (CI: 0.06, 0.10) and 0.09 (CI: 0.07, 0.12) times, respectively, that of those who disagree. The odds of being UTD are higher for those who responded with "strongly agree" than with "agree" or "do not know" when the reference group is "do not agree" for statements with positive consequences towards vaccination, whereas the odds of being UTD for those who responded with "strongly agree" than with "agree" to statements that are negative towards vaccination are lowest.

Table 15.1. Logistic regression of parental attitudes towards immunization and vaccination coverage for DTPPolHibMMR for the number of doses at series 33333111, diphtheria and *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children 24-35 months living in Switzerland, 1999-2003

variable		n	%	Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	Coverage Di (3 doses) %(±95%CI)	Odds Ratio Di (3 doses) (±95%CI)
follow recommendations of doctor	do not know	82	1.1	52.2 (35.5, 68.9)	**4.84**	**(3.00, 10.21)**	84.1 (69.4, 98.8)	1.69	(0.51, 5.62)
	disagree	851	9.0	18.4 (14.4, 22.4)		ref	75.8 (71.1, 80.5)		ref
	agree	4409	56.2	81.5 (79.5, 83.4)	**19.50**	**(14.61, 26.03)**	97.5 (96.9, 98.2)	**12.62**	**(8.87, 17.98)**
	strongly agree	2973	33.7	89.6 (88.0, 91.2)	**38.34**	**(27.94, 52.60)**	98.2 (97.4, 99.0)	**17.46**	**(10.40, 29.32)**
too much social pressure to vaccinate kids	do not know	831	12.4	84.3 (81.0, 87.7)	0.80	(0.61, 1.10)	97.7 (96.3, 99.1)	0.61	(0.28, 1.33)
	disagree	4465	58.0	86.9 (85.5, 88.4)		ref	98.6 (98.0, 99.2)		ref
	agree	1812	22.8	62.5 (59.1, 65.9)	**0.25**	**(0.21, 0.30)**	92.9 (91.2, 94.6)	**0.19**	**(0.11, 0.30)**
	strongly agree	617	6.9	39.2 (33.8, 44.5)	**0.10**	**(0.08, 0.12)**	74.9 (70.3, 79.6)	**0.04**	**(0.03, 0.70)**
vaccination protects from certain diseases	do not know	140	1.3	54.7 (43.6, 65.8)	**4.31**	**(2.33, 8.00)**	74.2 (62.6, 85.8)	**2.77**	**(1.38, 5.57)**
	disagree	191	2.1	21.9 (13.9, 29.9)		ref	51.0 (39.6, 62.4)		ref
	agree	4805	61.0	76.9 (75.0, 78.8)	**11.87**	**(7.36, 19.15)**	96.0 (95.2, 96.8)	**23.00**	**(13.94, 38.1)**
	strongly agree	3172	35.7	84.6 (82.7, 86.4)	**19.58**	**(11.87, 32.30)**	98.5 (97.8, 99.2)	**64.63**	**(33.11, 126.16)**
solidarity is important	do not know	642	7.3	75.3 (70.2, 80.5)	**5.14**	**(3.64, 7.26)**	94.8 (91.9, 97.7)	**4.39**	**(2.22, 8.68)**
	disagree	1151	13.9	37.3 (32.4, 42.1)		ref	80.7 (77.3, 84.0)		ref
	agree	4030	50.0	83.2 (81.5, 85.0)	**8.36**	**(6.55, 10.66)**	98.0 (97.4, 98.6)	**11.72**	**(8.10, 17.03)**
	strongly agree	2451	28.8	89.5 (87.7, 91.4)	**14.36**	**(10.94, 18.86)**	98.9 (98.2, 99.7)	**22.52**	**(10.34, 49.04)**
doctors provide enough information about vaccination	do not know	489	6.2	69.6 (64.2, 75.0)	**1.58**	**(1.18, 2.10)**	94.8 (92.0, 97.5)	1.67	(0.91, 3.05)
	disagree	2389	29.7	59.3 (56.3, 62.2)		ref	91.6 (90.0, 93.1)		ref
	agree	4251	51.2	75.4 (73.5, 77.3)	**2.11**	**(1.84, 2.41)**	97.7 (97.1, 98.4)	**4.00**	**(2.87, 5.56)**
	strongly agree	1179	12.8	77.5 (80.8, 1.73)	**2.36**	**(1.90, 2.94)**	97.2 (95.4, 99.0)	**3.20**	**(1.58, 6.46)**
concerns about possible side effects	do not know	508	7.4	87.7 (83.7, 91.8)	0.95	(0.63, 1.44)	96.6 (94.0, 99.1)	0.46	(0.18, 1.17)
	disagree	3063	36.8	88.2 (86.5, 90.0)		ref	98.4 (97.7, 99.1)		ref
	agree	3444	43.2	76.2 (73.6, 78.8)	**0.43**	**(0.35, 0.52)**	96.5 (95.5, 97.5)	**0.45**	**(0.26, 0.77)**
	strongly agree	1243	12.5	47.8 (43.8, 51.7)	**0.12**	**(0.10, 0.15)**	84.0 (81.3, 86.8)	**0.09**	**(0.05, 0.14)**

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)	Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)
follow recommendations of doctor	do not know	82	1.1	75.8 (61.6, 90.1)	1.76	(0.75, 4.11)	60.3 (44.0, 76.6)	**4.90**	**(2.40, 10.01)**
	disagree	851	9.0	64.1 (58.9, 69.4)		ref	23.7 (19.6, 27.8)		ref
	agree	4409	56.2	93.1 (92.0, 94.1)	**7.53**	**(5.71, 9.93)**	85.9 (84.1, 87.7)	**19.65**	**(14.99, 25.78)**
	strongly agree	2973	33.7	96.1 (95.1, 97.1)	**13.68**	**(9.77, 19.14)**	93.0 (91.8, 94.2)	**42.70**	**(31.88, 57.17)**
too much social pressure to vaccinate kids	do not know	831	12.4	93.4 (91.3, 95.4)	**0.59**	**(0.41, 0.85)**	89.1 (85.6, 92.7)	0.85	(0.58, 1.25)
	disagree	4465	58.0	96.0 (95.2, 96.8)		ref	90.6 (89.4, 91.7)		ref
	agree	1812	22.8	85.6 (82.9, 88.2)	**0.25**	**(0.19, 0.32)**	67.7 (64.6, 70.9)	**0.22**	**(0.18, 0.26)**
	strongly agree	617	6.9	64.6 (59.5, 69.7)	**0.08**	**(0.06, 0.10)**	43.6 (38.2, 48.9)	**0.08**	**(0.06, 0.10)**
vaccination protects from certain diseases	do not know	140	1.3	66.4 (55.0, 77.9)	**2.83**	**(1.43, 5.60)**	64.4 (54.2, 74.7)	**5.16**	**(2.73, 9.74)**
	disagree	191	2.1	41.2 (29.5, 52.9)		ref	26.0 (17.4, 34.5)		ref
	agree	4805	61.0	91.2 (90.1, 92.3)	**14.80**	**(9.20, 24.26)**	81.0 (79.2, 82.8)	**12.15**	**(7.61, 19.39)**
	strongly agree	3172	35.7	95.6 (94.5, 96.6)	**31.00**	**(17.80, 53.96)**	88.6 (87.0, 90.3)	**22.25**	**(13.74, 36.03)**
solidarity is important	do not know	642	7.3	89.5 (86.1, 92.9)	**3.88**	**(2.52, 5.96)**	81.3 (77.4, 85.1)	**6.26**	**(4.55, 8.62)**
	disagree	1151	13.9	68.8 (64.6, 72.9)		ref	40.9 (36.1, 45.7)		ref
	agree	4030	50.0	95.0 (93.9, 96.0)	**8.54**	**(6.31, 11.56)**	87.3 (85.7, 89.0)	**9.96**	**(7.79, 12.74)**
	strongly agree	2451	28.8	96.3 (95.3, 97.4)	**11.97**	**(8.47, 16.90)**	93.6 (92.3, 95.0)	**21.30**	**(15.95, 28.44)**
doctors provide enough information about vaccination	do not know	489	6.2	87.1 (83.3, 90.9)	1.17	(0.82, 1.67)	83.2 (78.7, 87.8)	**2.06**	**(1.47, 2.88)**
	disagree	2389	29.7	85.2 (83.2, 87.3)		ref	70.7 (67.9, 73.5)		ref
	agree	4251	51.2	94.2 (93.2, 95.2)	**2.81**	**(2.23, 3.55)**	87.0 (85.6, 88.5)	**2.79**	**(2.35, 3.30)**
	strongly agree	1179	12.8	95.4 (93.9, 96.9)	**3.58**	**(2.44, 5.25)**	88.9 (86.4, 91.4)	**3.33**	**(2.50, 4.44)**
concerns about possible side effects	do not know	508	7.4	96.6 (94.0, 99.2)	0.45	(0.18, 1.11)	92.1 (88.2, 96.0)	1.01	(0.57, 1.79)
	disagree	3063	36.8	98.4 (97.8, 99.0)		ref	92.0 (90.6, 93.4)		ref
	agree	3444	43.2	96.5 (95.5, 97.5)	**0.44**	**(0.27, 0.72)**	80.7 (78.5, 83.0)	**0.36**	**(0.29, 0.45)**
	strongly agree	1243	12.5	82.8 (79.9, 85.6)	**0.08**	**(0.05, 0.12)**	51.5 (47.5, 55.4)	**0.09**	**(0.07, 0.12)**

CI: confidence interval; ref: reference group

For schoolchildren, the trend remains similar to those apparent by the toddlers, but the magnitude of the odds of being UTD is smaller, with the magnitude decreasing with increasing age (Tables 15.2, 15.3). Of the 4 conditions examined for being UTD, the differences in the odds of being UTD for measles at one dose are distinctly magnified among the 6 statements posed. For example, for responses as to whether or not parents of children at school entry follow the recommendations of their doctor, the odds of being UTD for the 44443111 series, 4 doses of Di and 3 doses of Hib for those who strongly agree with this statement are 6.51 (CI: 4.81, 8.82), 3.26 (CI: 2.29, 4.62), and 3.86 (CI: 2.96, 5.04) times, respectively, that of those who disagree; for measles at one dose, the odds of being UTD is 22.15 (CI: 15.80, 31.05). Although the same trend is prominent among the adolescents, the the odds of being UTD for the 5505111 series, 5 doses of Di and 5 doses of Pol, and 1 dose of measles vaccination for those who strongly agree with this statement are only 3.39 (CI: 2.55, 4.49), 2.10 (CI: 1.53, 2.86), 1.76 (CI: 1.29, 2.41), and 6.51 (CI: 4.10, 10.38) times, respectively, that of those who disagree. Notable is also for those who responded with ”do not know” to these questions. Teenagers whose parents are unsure of how to respond have a lower chance of being UTD for the immunization series 5505111 and Di and Pol at 5 doses than those who disagreed with the statements. As seen in Table 15.3.1, the same trend is revealed for HepB at both 1 dose and 3 doses.

Table 15.2. Logistic regression of parental attitudes towards immunization and vaccination coverage for DTPPolHibMMR for the number of doses at series 44443111, diphtheria at 4 doses and *Haemophilus influenzae* type B (Hib) at 3 doses and measles at 1 dose for children at school entry living in Switzerland, 1999-2003

variable		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio series 44443111 (±95%CI)		Coverage Di (4 doses) %(±95%CI)	Odds Ratio Di (4 doses) (±95%CI)	
follow recommendations of doctor	do not know	94	1.5	24.0 (12.8, 35.1)	1.48	(0.78, 2.78)	70.4 (56.2, 84.5)	0.55	(0.26, 1.14)
	disagree	531	8.2	17.6 (13.4, 21.8)		ref	81.3 (77.2, 85.4)		ref
	agree	3341	56.9	44.6 (42.1, 47.1)	**3.77**	**(2.78, 5.11)**	94.8 (93.8, 95.8)	**4.21**	**(2.98, 5.96)**
	strongly agree	2481	33.5	58.2 (55.3, 61.0)	**6.51**	**(4.81, 8.82)**	93.4 (92.1, 94.7)	**3.26**	**(2.29, 4.62)**
too much social pressure to vaccinate kids	do not know	796	13.1	44.0 (39.1, 48.8)	**0.74**	**(0.61, 0.90)**	89.6 (86.6, 92.5)	**0.37**	**(0.25, 0.52)**
	disagree	3520	57.1	51.5 (49.1, 53.9)		ref	95.9 (95.0, 96.8)		ref
	agree	1485	22.9	42.0 (38.8, 45.3)	**0.68**	**(0.59, 0.79)**	90.7 (88.7, 92.7)	**0.42**	**(0.30, 0.58)**
	strongly agree	528	7.0	30.5 (25.1, 35.9)	**0.41**	**(0.32, 0.54)**	80.4 (76.0, 84.8)	**0.17**	**(0.12, 0.25)**
vaccination protects from certain diseases	do not know	110	1.8	27.2 (16.4, 38.1)	0.96	(0.44, 2.13)	82.6 (74.2, 91.0)	2.11	(1.00, 4.43)
	disagree	115	1.7	28.0 (16.7, 39.3)		ref	69.2 (58.2, 80.3)		ref
	agree	3674	61.9	42.3 (40.0, 44.7)	**1.89**	**(1.08, 3.29)**	93.5 (92.3, 94.6)	**6.34**	**(3.70, 10.88)**
	strongly agree	2567	34.6	56.4 (53.7, 59.1)	**3.32**	**(1.89, 5.82)**	93.4 (92.2, 94.7)	**6.32**	**(3.67, 10.89)**
solidarity is important	do not know	440	6.8	44.4 (38.6, 50.2)	**2.33**	**(1.69, 3.20)**	94.2 (91.6, 96.8)	**2.66**	**(1.53, 4.65)**
	disagree	916	16.0	25.5 (21.3, 29.8)		ref	86.0 (83.0, 89.0)		ref
	agree	3040	49.7	47.9 (45.4, 50.4)	**2.68**	**(2.12, 3.39)**	94.9 (93.8, 96.0)	**3.00**	**(2.20, 4.10)**
	strongly agree	2006	27.4	58.2 (55.1, 61.3)	**4.06**	**(3.17, 5.19)**	92.9 (91.3, 94.5)	**2.12**	**(1.48, 3.02)**
doctors provide enough information about vaccination	do not know	405	6.6	43.4 (37.2, 49.6)	1.14	(0.86, 1.52)	89.8 (86.0, 93.5)	0.85	(0.53, 1.36)
	disagree	1660	26.4	40.1 (37.1, 43.1)		ref	91.2 (89.2, 93.1)		ref
	agree	3285	52.5	48.1 (45.6, 50.7)	**1.39**	**(1.20, 1.60)**	94.7 (93.7, 95.8)	**1.74**	**(1.29, 2.35)**
	strongly agree	1090	14.6	55.5 (51.5, 59.4)	**1.86**	**(1.54, 2.25)**	91.2 (89.0, 93.3)	1.00	(0.71, 1.42)
concerns about possible side effects	do not know	497	8.1	41.9 (36.7, 47.1)	**0.66**	**(0.52, 0.83)**	87.9 (84.3, 91.6)	**0.33**	**(0.21, 0.51)**
	disagree	2249	35.5	52.3 (49.3, 55.4)		ref	95.7 (94.5, 96.9)		ref
	agree	2590	42.0	44.9 (42.1, 47.8)	**0.74**	**(0.63, 0.87)**	94.0 (92.7, 95.2)	**0.70**	**(0.51, 0.97)**
	strongly agree	1042	14.4	41.2 (37.2, 45.2)	**0.64**	**(0.52, 0.78)**	85.7 (82.8, 88.6)	**0.27**	**(0.19, 0.39)**

variable		n	%	Coverage for Hib (3 doses) %(±95%CI)	Odds Ratio Hib (3 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 dose) (±95%CI)	
follow recommendations of doctor	do not know	94	1.5	59.7 (46.3, 73.2)	1.15	(0.64, 2.05)	68.0 (56.0, 80.1)	**2.47**	**(1.36, 4.50)**
	disagree	531	8.2	56.4 (51.0, 61.8)		ref	46.3 (40.7, 51.9)		ref
	agree	3341	56.9	80.8 (78.9, 82.7)	**3.25**	**(2.54, 4.16)**	92.1 (90.8, 93.4)	**13.52**	**(10.11, 18.06)**
	strongly agree	2481	33.5	83.3 (81.1, 85.5)	**3.86**	**(2.96, 5.04)**	95.1 (93.9, 96.1)	**22.15**	**(15.80, 31.05)**
too much social pressure to vaccinate kids	do not know	796	13.1	76.7 (72.9, 80.5)	**0.65**	**(0.51, 0.83)**	92.6 (90.3, 94.8)	**0.64**	**(0.46, 0.89)**
	disagree	3520	57.1	83.6 (81.6, 85.5)		ref	95.1 (94.2, 96.1)		ref
	agree	1485	22.9	74.9 (71.6, 78.2)	**0.59**	**(0.47, 0.74)**	79.1 (76.5, 81.8)	**0.19**	**(0.15, 0.25)**
	strongly agree	528	7.0	65.4 (60.2, 70.6)	**0.37**	**(0.29, 0.48)**	60.8 (55.3, 66.3)	**0.08**	**(0.06, 0.11)**
vaccination protects from certain diseases	do not know	110	1.8	69.3 (59.3, 79.2)	1.90	(0.94, 3.85)	72.9 (63.0, 82.9)	1.83	(0.92, 3.63)
	disagree	115	1.7	54.2 (41.5, 67.0)		ref	59.6 (47.9, 71.2)		ref
	agree	3674	61.9	77.8 (75.8, 79.7)	**2.95**	**(1.76, 4.95)**	87.5 (86.0, 89.0)	**4.75**	**(2.90, 7.77)**
	strongly agree	2567	34.6	83.7 (81.6, 85.7)	**4.32**	**(2.55, 7.31)**	93.6 (92.8, 94.8)	**9.88**	**(5.75, 16.96)**
solidarity is important	do not know	440	6.8	80.1 (75.3, 84.9)	**2.12**	**(1.51, 2.98)**	87.7 (84.1, 91.2)	**3.91**	**(2.65, 5.76)**
	disagree	916	16.0	65.6 (61.6, 69.5)		ref	64.5 (60.6, 68.4)		ref
	agree	3040	49.7	81.8 (79.7, 83.9)	**2.36**	**(1.91, 2.92)**	93.3 (92.0, 94.5)	**7.61**	**(5.98, 9.69)**
	strongly agree	2006	27.4	82.9 (80.6, 85.3)	**2.55**	**(2.02, 3.24)**	95.4 (94.2, 96.6)	**11.35**	**(8.18, 15.76)**
doctors provide enough information about vaccination	do not know	405	6.6	71.9 (66.3, 77.5)	0.76	(0.56, 1.04)	86.7 (82.4, 91.0)	**1.66**	**(1.11, 2.47)**
	disagree	1660	26.4	77.0 (73.3, 79.7)		ref	79.8 (77.2, 82.3)		**ref**
	agree	3285	52.5	81.5 (79.5, 83.5)	**1.31**	**(1.09, 1.59)**	93.0 (91.7, 94.2)	**3.36**	**(2.67, 4.24)**
	strongly agree	1090	14.6	79.6 (76.2, 83.1)	1.17	(0.90, 1.51)	92.0 (90.1, 94.0)	**2.94**	**(2.16, 4.01)**
concerns about possible side effects	do not know	497	8.1	75.8 (71.5, 80.1)	**0.66**	**(0.50, 0.86)**	93.5 (91.0, 96.1)	**0.72**	**(0.44, 1.18)**
	disagree	2249	35.5	82.7 (80.2, 85.1)		ref	95.3 (94.1, 96.4)		**ref**
	agree	2590	42.0	78.8 (76.5, 81.1)	**0.78**	**(0.62, 0.97)**	88.3 (86.6, 90.1)	**0.38**	**(0.28, 0.50)**
	strongly agree	1042	14.4	75.4 (72.1, 78.7)	**0.64**	**(0.51, 0.81)**	71.3 (68.0, 74.7)	**0.12**	**(0.09, 0.17)**

CI: confidence interval. ref: reference group. BE, JU, TI, VD: not included in analysis.

Table 15.3. Logistic regression of parental attitudes towards immunization and vaccination coverage for DTPPolMMR for the number of doses at series 5505111, diphtheria at 5 doses, polio at 5 doses and measles at 1 dose for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for series 5505111 %(±95%CI)	Odds Ratio series 5505111 (±95%CI)		Coverage for Di(5 doses) %(±95%CI)	Odds Ratio Di (5 doses) (±95%CI)	
follow recommendations of doctor	do not know	127	2.5	47.5 (34.5, 60.5)	0.87	(0.51, 1.49)	52.8 (40.1, 65.5)	**0.46**	**(0.27, 0.77)**
	disagree	421	7.6	51.0 (45.0, 57.0)		ref	71.0 (65.6, 76.4)		ref
	agree	3297	61.6	72.7 (70.0, 75.3)	**2.55**	**(2.01, 3.25)**	80.9 (78.5, 83.3)	**1.73**	**(1.31, 2.29)**
	strongly agree	1940	28.4	77.9 (75.3, 80.5)	**3.39**	**(2.55, 4.49)**	83.7 (81.2, 86.2)	**2.10**	**(1.53, 2.86)**
too much social pressure to vaccinate kids	do not know	840	15.9	65.4 (60.5, 70.3)	**0.57**	**(0.46, 0.72)**	70.9 (66.0, 75.9)	**0.44**	**(0.35, 0.57)**
	disagree	3217	57.3	76.7 (74.3, 79.0)		ref	84.6 (82.6, 86.5)		ref
	agree	1241	21.1	68.4 (65.1, 71.7)	**0.66**	**(0.55, 0.79)**	79.3 (76.4, 82.2)	**0.70**	**(0.56, 0.87)**
	strongly agree	395	5.7	58.5 (52.1, 64.8)	**0.43**	**(0.32, 0.57)**	72.5 (66.3, 78.7)	**0.48**	**(0.34, 0.68)**
vaccination protects from certain diseases	do not know	94	1.5	56.1 (43.2, 68.9)	0.85	(0.39, 1.84)	62.8 (49.4, 76.3)	0.55	(0.24, 1.24)
	disagree	72	1.2	60.1 (46.1, 74.1)		ref	75.4 (64.0, 86.9)		ref
	agree	3232	62.7	70.2 (67.5, 72.9)	1.56	(0.89, 2.76)	80.1 77.6, 82.5()	1.31	(0.71, 2.41)
	strongly agree	2565	34.7	75.4 (73.0, 77.9)	**2.04**	**(1.12, 3.71)**	81.2 (78.7, 83.7)	1.41	(0.75, 2.63)
solidarity is important	do not know	384	7.0	68.6 (61.9, 75.3)	1.35	(0.95, 1.92)	79.9 (73.8, 86.0)	1.12	(0.72, 1.74)
	disagree	650	12.5	61.8 (57.5, 66.0)		ref	78.1(74.5, 81.6)		ref
	agree	2959	52.0	73.4 (70.5, 76.2)	**1.71**	**(1.39, 2.09)**	80.9 (78.2, 83.7)	1.19	(0.93, 1.53)
	strongly agree	1965	28.6	74.8 (71.9, 77.7)	**1.84**	**(1.45, 2.33)**	80.2 (77.3, 83.0)	1.13	(0.87, 1.49)
doctors provide enough information about vaccination	do not know	436	8.3	60.3 (53.9, 66.8)	**0.70**	**(0.54, 0.92)**	72.0 (66.0, 77.9)	**0.70**	**(0.51, 0.96)**
	disagree	1341	24.4	68.4 (65.3, 71.6)		ref	78.6 (75.9, 81.4)		ref
	agree	3102	54.8	74.4 (72.1, 76.8)	**1.34**	**(1.15, 1.57)**	82.3 (79.9, 84.6)	**1.26**	**(1.04, 1.53)**
	strongly agree	889	12.4	74.4 (70.5, 78.3)	**1.34**	**(1.04, 1.72)**	80.2 (76.4, 84.0)	1.10	(0.83, 1.46)
concerns about possible side effects	do not know	533	10.4	60.3 (54.5, 66.1)	**0.46**	**(0.36, 0.60)**	66.6 (60.7, 72.5)	**0.41**	**(0.31, 0.52)**
	disagree	2189	39.0	76.6 (73.9, 79.4)		ref	83.3 (80.8, 85.7)		ref
	agree	2261	39.8	71.1 (68.4, 73.8)	**0.75**	**(0.62, 0.90)**	81.0 (78.8, 83.2)	0.86	(0.70, 1.05)
	strongly agree	762	10.8	68.9 (65.0, 72.7)	**0.67**	**(0.53, 0.85)**	79.3 (75.5, 83.1)	0.77	(0.58, 1.02)

variable		n	%	Coverage Pol (5 doses) %(±95%CI)	Odds Ratio Pol (5 doses) (±95%CI)		Coverage Measles (1 dose) %(±95%CI)	Odds Ratio Measles (1 doses) (±95%CI)	
follow recommendations of doctor	do not know	127	2.5	52.8 (40.1, 65.5)	**0.44**	**(0.26, 0.75)**	90.4 (84.0, 96.7)	1.96	(0.90, 4.30)
	disagree	421	7.6	71.9 (66.4, 77.4)		ref	82.7 (78.5, 86.9)		ref
	agree	3297	61.6	80.1 (77.7, 82.4)	**1.57**	**(1.21, 2.04)**	94.8 (93.9, 95.7)	**3.79**	**(2.69, 5.35)**
	strongly agree	1940	28.4	81.8 (79.3, 84.4)	**1.76**	**(1.29, 2.41)**	96.9 (95.8, 98.0)	**6.51**	**(4.10, 10.38)**
too much social pressure to vaccinate kids	do not know	840	15.9	70.8 (66.3, 75.4)	**0.50**	**(0.39, 0.63)**	95.8 (94.1, 97.4)	0.79	(0.51, 1.20)
	disagree	3217	57.3	82.9 (80.8, 85.1)		ref	96.6 (95.9, 97.4)		ref
	agree	1241	21.1	78.5 (75.5, 81.6)	**0.75**	**(0.60, 0.95)**	91.0 (89.1, 92.9)	**0.35**	**(0.26, 0.49)**
	strongly agree	395	5.7	72.8 (66.4, 79.1)	**0.55**	**(0.39, 0.78)**	80.6 (75.4, 85.8)	**0.14**	**(0.10, 0.22)**
vaccination protects from certain diseases	do not know	94	1.5	63.9 (50.7, 77.1)	0.66	(0.29, 1.49)	81.9 (72.1, 91.8)	0.78	(0.29, 2.05)
	disagree	72	1.2	72.9 (60.3, 85.6)		ref	85.4 (76.6, 94.1)		ref
	agree	3232	62.7	79.4 (76.9, 81.9)	1.43	(0.76, 2.68)	93.6 (92.6, 94.5)	**2.48**	**(1.22, 5.07)**
	strongly agree	2565	34.7	79.4 (76.9, 81.9)	1.43	(0.75, 2.72)	96.7 (95.9, 97.6)	**5.09**	**(2.36, 11.00)**
solidarity is important	do not know	384	7.0	76.6 (70.3, 82.9)	1.04	(0.70, 1.56)	90.8 (86.6, 95.0)	**1.82**	**(1.03, 3.23)**
	disagree	650	12.5	75.9 (72.0, 79.7)		ref	84.5 (81.2, 87.7)		ref
	agree	2959	52.0	80.8 (78.2, 83.4)	**1.34**	**(1.08, 1.67)**	96.0 (95.2, 96.9)	**4.45**	**(3.11, 6.36)**
	strongly agree	1965	28.6	78.7 (75.8, 81.6)	1.17	(0.90, 1.53)	96.9 (95.9, 97.8)	**5.69**	**(3.83, 8.45)**
doctors provide enough information about vaccination	do not know	436	8.3	68.8 (62.6, 75.0)	**0.64**	**(0.48, 0.86)**	90.3 (86.3, 94.3)	0.78	(0.46, 1.31)
	disagree	1341	24.4	77.4 (74.6, 80.2)		ref	92.3 (90.5, 94.1)		ref
	agree	3102	54.8	81.5 (79.3, 83.7)	**1.29**	**(1.07, 1.54)**	95.6 (94.8, 96.4)	**1.81**	**(1.33, 2.48)**
	strongly agree	889	12.4	79.4 (75.4, 83.4)	1.13	(0.85, 1.49)	95.9 (94.1, 97.7)	**1.96**	**(1.16, 3.30)**
concerns about possible side effects	do not know	533	10.4	68.9 (63.3, 74.6)	**0.47**	**(0.36, 0.62)**	95.0 (92.8, 97.2)	0.64	(0.38, 1.07)
	disagree	2189	39.0	82.5 (80.0, 85.0)		ref	96.8 (95.9, 97.6)		ref
	agree	2261	39.8	78.9 (76.5, 81.3)	**0.79**	**(0.65, 0.96)**	93.6 (92.4, 94.8)	**0.49**	**(0.34, 0.70)**
	strongly agree	762	10.8	78.5 (74.7, 82.3)	0.77	(0.59, 1.10)	87.6 (84.6, 90.6)	**0.24**	**(0.16, 0.35)**

CI: confidence interval; ref: reference group. BE, JU, TI, VD: not included in the analysis

Table 15.3.1. Logistic regression of parental attitudes towards immunization and vaccination coverage for Hepatitis B (HepB) at one dose and three doses for children at school departure living in Switzerland, 1999-2003

variable		n	%	Coverage for HepB (1 dose) %(±95%CI)	Odds Ratio HepB (1 dose) (±95%CI)		Coverage for HepB (3 doses) %(±95%CI)	Odds Ratio HepB (3 doses) (±95%CI)	
follow recommendations of doctor	do not know	127	2.5	31.6 (18.6, 44.6)	**1.98**	**(1.05, 3.74)**	20.3 (7.5, 33.0)	**2.90**	**(1.37, 6.14)**
	disagree	421	7.6	18.9 (14.1, 23.8)		ref	8.1 (4.9, 11.2)		ref
	agree	3297	61.6	37.8 (33.6, 41.9)	**2.60**	**(1.96, 3.44)**	21.4 (18.5, 24.2)	**3.10**	**(2.09, 4.62)**
	strongly agree	1940	28.4	56.6 (51.7, 61.4)	**5.58**	**(3.97, 7.85)**	33.1 (29.2, 37.0)	**5.65**	**(3.62, 8.82)**
too much social pressure to vaccinate kids	do not know	840	15.9	45.3 (39.4, 51.1)	1.04	(0.82, 1.32)	28.9 (23.7, 34.2)	1.21	(0.96, 1.55)
	disagree	3217	57.3	44.3 (40.1, 48.6)		ref	25.0 (22.2, 27.9)		ref
	agree	1241	21.1	34.5 (29.9, 39.0)	**0.66**	**(0.56, 0.78)**	18.8 (15.5, 22.2)	**0.69**	**(0.58, 0.83)**
	strongly agree	395	5.7	32.0 (25.4, 38.7)	**0.59**	**(0.44, 0.80)**	14.0 (9.9, 18.1)	**0.49**	**(0.35, 0.68)**
vaccination protects from certain diseases	do not know	94	1.5	28.4 (17.2, 39.6)	0.95	(0.40, 2.23)	15.8 (6.3, 25.3)	1.64	(0.55, 4.86)
	disagree	72	1.2	29.6 (16.1, 43.0)		ref	10.3 (3.0, 17.6)		ref
	agree	3232	62.7	35.5 (31.5, 39.6)	1.31	(0.67, 2.59)	19.9 (16.9, 22.8)	2.16	(0.98, 4.75)
	strongly agree	2565	34.7	53.0 (48.2, 57.9)	**2.69**	**(1.43, 5.08)**	31.3 (27.6, 35.0)	**3.97**	**(1.83, 8.61)**
solidarity is important	do not know	384	7.0	35.8 (29.3, 42.3)	**2.51**	**(1.81, 3.48)**	18.3 (13.7, 22.9)	**2.21**	**(1.52, 3.24)**
	disagree	650	12.5	18.2 (13.8, 22.6)		ref	9.1 (6.5, 11.8)		ref
	agree	2959	52.0	40.1 (35.9, 44.2)	**3.00**	**(2.33, 3.87)**	22.6 (19.4, 25.8)	**2.90**	**(2.18, 3.87)**
	strongly agree	1965	28.6	55.7 (50.9, 60.4)	**5.65**	**(4.16, 7.67)**	33.4 (29.5, 37.4)	**5.00**	**(3.58, 6.96)**
doctors provide enough information about vaccination	do not know	436	8.3	36.9 (30.5, 43.3)	**1.32**	**(1.01, 1.74)**	20.4 (15.5, 25.2)	1.33	(0.96, 1.83)
	disagree	1341	24.4	30.7 (26.5, 34.8)		ref	16.1 (13.2, 19.1)		ref
	agree	3102	54.8	43.6 (39.5, 47.8)	**1.75**	**(1.50, 2.04)**	25.5 (22.4, 28.7)	**1.78**	**(1.49, 2.13)**
	strongly agree	889	12.4	56.1 (50.8, 61.4)	**2.89**	**(2.32, 3.59)**	32.7 (27.8, 37.5)	**2.52**	**(1.94, 3.27)**
concerns about possible side effects	do not know	533	10.4	42.4 (35.4, 49.3)	0.84	(0.62, 1.12)	25.9 (19.5, 32.3)	0.95	(0.69, 1.30)
	disagree	2189	39.0	46.8 (42.3, 51.3)		ref	26.9 (23.8, 30.0)		ref
	agree	2261	39.8	38.1 (34.0, 42.3)	**0.70**	**(0.60, 0.82)**	21.3 (18.4, 24.3)	**0.74**	**(0.63, 0.87)**
	strongly agree	762	10.8	33.1 (27.7, 38.4)	**0.56**	**(0.44, 0.71)**	18.0 (13.8, 22.2)	**0.60**	**(0.46, 0.77)**

CI: confidence interval; ref: reference group
BE, JU, TI, VD: not included in the analysis

3.11 Perception of the dangers of childhood vaccine preventable diseases

Question: In your opinion, would the following illnesses be very dangerous, dangerous, or not dangerous for your child if he / she has not been vaccinated?

Presented in Tables 16.1-16.3 is the logistic regression of parental perceptions of the dangers of certain childhood vaccine preventable diseases with different immunization coverage estimates for all three age groups. For toddlers, Pol, Hib and Te are perceived as extremely dangerous by 72.8%, 80.0% and 56.5% respectively, of parents, with Di at 44.7% and Per at 23.1%; in contrast, almost 50% of parents do not view measles, mumps and rubella as dangerous (Table 16.1). Consequently, this perception greatly influences the chances of the child being vaccinated, with the likelihood that a toddler is vaccinated for a disease perceived as dangerous is significantly higher than when the disease is not perceived as dangerous; the odds ratios range between 1.57- 11.50, with the largest difference observed with Hib. Moreover, even toddlers of parents who answer ”do not know” to this question are better vaccinated than those responding ”not dangerous”; the percentages of those UTD increase as the responses proceed towards the positive spectrum, with ”very dangerous” yielding the highest immunization coverage.

As in the comparison for attitudes towards vaccination between children at school entry and toddlers, the same pattern can be found with the perception of the dangers of childhood preventable diseases. Children at school entry whose parents believed that a disease is very dangerous have the greatest chance of being UTD (range 1.25-3.06), with the magnitude of the odds of being UTD higher by the toddlers (Table 16.2).

Teenagers whose parents perceived that a vaccine preventable disease is dangerous have a significantly higher chance of being UTD than those whose parents find it not dangerous. There is no distinction between those who responded with “dangerous” and “very dangerous”. Only by measles are the odds of being UTD for those who found it very dangerous not significantly different from those who do not find it dangerous. In contrast, adolescents whose parents are unsure

of how to rate the dangerousness of measles, mumps and rubella are less likely to be UTD at the 6605111 and 5505111 immunization series than those whose parents perceived these diseases as being not dangerous; the odds of being UTD for the 5505111 series being 0.56 (CI: 0.41, 0.76), 0.63 (CI: 0.45, 0.87) and 0.68 (CI: 0.52, 0.90), respectively (Table 16.3).

Table 16.1. Logistic regression of parental perceptions of the dangers of certain childhood vaccine preventable diseases and immunization coverage for DTPPolHibMMR for the number of doses at series 44443111 and 3333111 for children 24-35 months of age living in Switzerland, 1999-2003

Vaccine preventable illnesses		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	
Diphtheria	do not know	1075	15.0	72.5 (68.8, 76.1)	**2.88**	**(2.03, 4.10)**	80.2 (77.0, 83.3)	**3.05**	**(2.04, 4.57)**
	not dangerous	315	3.4	47.7 (40.0, 55.4)		ref	57.0 (48.5, 65.4)		ref
	dangerous	3068	37.2	68.8 (66.3, 71.4)	**2.42**	**(1.72, 3.40)**	76.3 (73.9, 78.8)	**2.44**	**(1.63, 3.63)**
	very dangerous	3611	44.4	73.2 (70.9, 75.6)	**3.00**	**(2.14, 4.19)**	80.3 (78.2, 82.3)	**3.08**	**(2.14, 4.43)**
Tetanus	do not know	440	6.0	68.6 (62.1, 75.2)	1.59	(0.97, 2.58)	77.2 (71.3, 83.1)	**1.75**	**(1.07, 2.84)**
	not dangerous	274	3.0	58.0 (49.4, 66.6)		ref	66.0 (57.3, 74.8)		ref
	dangerous	2882	34.5	69.3 (66.7, 72.0)	**1.64**	**(1.12, 2.40)**	77.2 (74.6, 79.7)	**1.74**	**(1.11, 2.72)**
	very dangerous	4533	56.5	72.0 (69.9, 74.2)	**1.86**	**(1.28, 2.72)**	79.0 (77.1, 80.8)	**1.93**	**(1.28, 2.90)**
Pertussis	do not know	830	12.0	75.7 (71.5, 79.9)	**2.83**	**(2.17, 3.70)**	83.5 (79.7, 87.3)	**3.58**	**(2.60, 4.93)**
	not dangerous	1404	16.1	52.3 (48.6, 56.0)		ref	58.6 (54.7, 62.5)		ref
	dangerous	3928	48.7	73.4 (70.9, 75.9)	**2.51**	**(2.07, 3.05)**	80.9 (78.7, 83.1)	**3.00**	**(2.40, 3.74)**
	very dangerous	1899	23.1	74.9 (71.8, 77.9)	**2.72**	**(2.20, 3.35)**	82.6 (79.9, 85.4)	**3.36**	**(2.71, 4.17)**
Polio	do not know	344	5.3	74.8 (68.5, 81.0)	**3.44**	**(1.92, 6.18)**	82.3 (76.9, 87.7)	**4.35**	**(2.31, 8.18)**
	not dangerous	142	1.8	46.3 (33.7, 58.8)		ref	51.6 (39.4, 63.8)		ref
	dangerous	1686	20.1	60.3 (56.7, 63.9)	**1.76**	**(1.03, 3.03)**	66.8 (63.2, 70.4)	**1.88**	**(1.11, 3.21)**
	very dangerous	5904	72.8	73.9 (72.1, 75.7)	**3.29**	**(1.97, 5.50)**	81.5 (80.0, 83.0)	**4.13**	**(2.51, 6.79)**

Vaccine preventable illnesses		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	
Haemophilus Influenzae type B (Hib)	do not know	247	3.6	64.7 (57.3, 72.0)	**6.49**	**(3.52, 11.95)**	69.8 (61.8, 77.9)	**5.64**	**(2.66, 11.96)**
	not dangerous	160	2.0	22.0 (13.5, 30.5)		ref	29.1 (17.5, 40.8)		ref
	dangerous	1166	14.4	55.0 (50.6, 59.3)	**4.33**	**(2.60, 7.20)**	61.4 (57.2, 65.6)	**3.87**	**(2.17, 6.91)**
	very dangerous	6557	80.0	74.9 (73.1, 76.7)	**10.56**	**(6.34, 17.59)**	82.5 (81.1, 84.0)	**11.50**	**(6.39, 20.69)**
Measles	do not know	473	6.6	73.3 (67.4, 79.1)	**1.57**	**(1.52, 2.14)**	81.5 (76.6, 86.5)	**1.88**	**(1.32, 2.68)**
	not dangerous	4190	49.3	63.6 (61.4, 65.8)		ref	70.1 (68.0, 72.3)		ref
	dangerous	2804	35.9	77.9 (75.2, 80.6)	**2.02**	**(1.70, 2.39)**	85.8 (83.8, 87.8)	**2.57**	**(2.15, 3.08)**
	very dangerous	641	8.2	77.2 (72.4, 81.9)	**1.94**	**(1.48, 2.53)**	86.6 (83.0, 90.1)	**2.74**	**(2.00, 3.77)**
Mumps	do not know	445	6.9	72.7 (65.9, 79.5)	**1.79**	**(1.24, 2.60)**	80.3 (74.9, 85.7)	**2.06**	**(1.44, 2.96)**
	not dangerous	3932	46.2	59,7 (57.3, 62.1)		ref	66.4 (64.1, 68.6)		ref
	dangerous	3041	38.4	81.2 (78.9, 83.5)	**2.92**	**(2.49, 3.41)**	89.0 (87.3, 90.7)	**4.09**	**(3.42, 4.89)**
	very dangerous	669	8.5	79.6 (74.9, 84.4)	**2.64**	**(1.94, 3.59)**	88.9 (85.1, 92.7)	**4.05**	**(2.73, 6.01)**
Rubella	do not know	498	6.9	74.1 (68.9, 79.4)	**1.83**	**(1.37, 2.45)**	81.6 (77.1, 86.6)	**2.17**	**(1.55, 3.04)**
	not dangerous	4067	48.4	61.0 (58.7, 63.3)		ref	67.5 (65.3, 69.7)		ref
	dangerous	2697	34.1	79.0 (76.4, 81.6)	**2.40**	**(2.04, 2.83)**	87.1 (85.0, 89.2)	**3.25**	**(2.68, 3.94)**
	very dangerous	822	10.7	83.0 (79.0, 87.0)	**3.13**	**(2.32, 4.22)**	91.5 (88.9, 94.1)	**5.17**	**(3.65, 7.34)**

CI: confidence interval; ref: reference group

Table 16.2. Logistic regression of parental perceptions of the dangers of certain childhood coverage for DTPPolHibMMR for the number of doses at series vaccine preventable diseases and immunization 44443111 and 3333111 for children at school entry living in Switzerland, 1999-2003

Vaccine preventable illnesses		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	
Diphtheria	do not know	722	11.8	43.8 (39.0, 48.6)	1.55	(1.07, 2.25)	67.3 (62.4, 72.3)	**1.76**	**(1.23, 2.53)**
	not dangerous	245	40.0	33.4 (26.6, 40.2)		ref	53.9 (46.8, 61.0)		ref
	dangerous	2430	39.7	46.2 (43.5, 48.9)	**1.71**	**(1.24, 2.35)**	70.1 (67.8, 72.4)	**2.01**	**(1.46, 2.77)**
	very dangerous	2759	44.5	48.8 (46.2, 51.4)	**1.90**	**(1.39, 2.60)**	72.5 (70.2, 74.8)	**2.26**	**(1.67, 3.06)**
Tetanus	do not know	295	5.0	39.2 (32.0, 46.4)	1.30	(0.83, 2.02)	63.2 (55.2, 71.2)	1.40	(0.90, 2.20)
	not dangerous	172	3.2	33.2 (25.2, 41.3)		ref	55.0 (46.9, 63.2)		ref
	dangerous	2111	34.0	48.0 (45.3, 50.6)	**1.85**	**(1.28, 2.69)**	72.0 (69.7, 74.3)	**2.10**	**(1.48, 2.99)**
	very dangerous	3694	57.9	46.8 (44.4, 49.1)	**1.77**	**(1.22, 2.55)**	70.4 (68.4, 72.4)	**1.94**	**(1.37, 2.74)**
Pertussis	do not know	590	9.5	44.6 (39.0, 50.2)	**1.51**	**(1.17, 1.94)**	69.8 (64.9, 74.8)	**1.87**	**(1.46, 2.41)**
	not dangerous	1179	19.8	34.8 (31.6, 38.0)		ref	55.3 (52.0, 58.6)		ref
	dangerous	3177	51.7	48.5 (46.0, 51.0)	**1.77**	**(1.50, 2.09)**	73.7 (71.8, 75.7)	**2.27**	**(1.93, 2.68)**
	very dangerous	1221	18.9	54.5 (51.0, 58.1)	**2.25**	**(1.85, 2.73)**	75.9 (73.0, 78.7)	**2.54**	**(2.08, 3.12)**
Polio	do not know	215	3.5	37.0 (29.0, 44.9)	1.21	(0.67, 2.20)	59.9 (51.7, 68.1)	1.37	(0.80, 2.33)
	not dangerous	98	2.0	32.6 (22.1, 43.2)		ref	52.2 (41.9, 62.5)		ref
	dangerous	1309	20.8	40.9 (37.7, 44.1)	1.43	(0.89, 2.30)	64.4 (61.2, 67.6)	**1.66**	**(1.06, 2.59)**
	very dangerous	4605	73.7	48.8 (46.6, 51.0)	**1.97**	**(1.22, 3.18)**	72.8 (70.9, 74.6)	**2.45**	**(1.59, 3.76)**
Vaccine preventable illnesses		n	%	Coverage for series 44443111 %(±95%CI)	Odds Ratio 44443111 (±95%CI)		Coverage for series 33333111 %(±95%CI)	Odds Ratio 33333111 (±95%CI)	
Haemophilus Influenzae type B (Hib)	do not know	181	11.8	31.9 (23.3, 40.4)	0.97	(0.50, 1.85)	56.2 (47.5, 64.9)	1.35	(0.79, 2.32)
	not dangerous	119	40.0	32.6 (21.1, 44.2)		ref	48.7 (37.8, 59.5)		ref
	dangerous	927	39.7	35.3 (31.4, 39.3)	1.13	(0.66, 1.93)	55.4 (51.2, 59.5)	1.31	(0.82, 2.09)
	very dangerous	4672	44.5	50.5 (48.3, 52.7)	**2.11**	**(1.25, 3.55)**	74.4 (72.6, 76.1)	**3.06**	**(1.98, 4.75)**
Measles	do not know	382	5.0	38.9 (32.0, 45.8)	0.81	(0.60, 1.09)	63.7 (57.8, 69.7)	0.86	(0.66, 1.11)
	not dangerous	3120	3.2	44.1 (41.7, 46.5)		ref	67.2 (65.2, 69.2)		ref
	dangerous	2202	34.0	49.7 (46.8, 52.7)	**1.25**	**(1.09, 1.45)**	74.0 (71.6, 76.4)	**1.39**	**(1.20, 1.61)**
	very dangerous	484	57.9	54.1 (48.8, 59.3)	**1.49**	**(1.19, 1.87)**	75.0 (70.3, 79.7)	**1.46**	**(1.13, 1.90)**
Mumps	do not know	366	9.5	39.4 (32.5, 46.3)	0.95	(0.71, 1.28)	65.9 (59.5, 72.3)	1.11	(0.83, 1.47)
	not dangerous	2848	19.8	40.5 (38.1, 43.0)		ref	63.4 (61.2, 65.9)		ref
	dangerous	2395	51.7	54.0 (51.3, 56.7)	**1.72**	**(1.51, 1.96)**	77.1 (74.9, 79.4)	**1.93**	**(1.66, 2.25)**
	very dangerous	577	18.9	50.7 (45.7, 55.7)	**1.51**	**(1.22, 1.87)**	75.5 (71.2, 79.9)	**1.77**	**(1.37, 2.28)**
Rubella	do not know	389	3.5	39.4 (33.3, 45.5)	0.88	(0.68, 1.14)	66.8 (61.1, 72.6)	1.10	(0.85, 1.44)
	not dangerous	2804	2.0	42.4 (40.0, 44.8)		ref	64.6 (62.3, 66.9)		ref
	dangerous	2245	20.8	51.3 (48.5, 54.1)	**1.43**	**(1.25, 1.63)**	75.3 (72.9, 77.7)	**1.67**	**(1.42, 1.96)**
	very dangerous	738	73.7	52.3 (47.7, 56.9)	**1.49**	**(1.22, 1.81)**	76.7 (72.7, 80.6)	**1.80**	**(1.43, 2.27)**

CI: confidence interval. ref: reference group. BE, JU, TI, VD: not included in analysis.

Table 16.3. Logistic regression of parental perceptions of the dangers of certain childhood vaccine preventable diseases and immunization coverage for DTPPolMMR for the number of doses at series 6605111 and 5505111 for children at school departure living in Switzerland, 1999-2003

Vaccine preventable illnesses		n	%	Coverage for series 6605111 %(±95%CI)	Odds Ratio series 6605111 (±95%CI)		Coverage for series 5505111 %(±95%CI)	Odds Ratio series 5505111 (±95%CI)	
Diphtheria	do not know	753	14.4	35.2 (30.3, 40.2)	1.17	(0.84, 1.62)	60.6 (54.9, 66.2)	0.88	(0.63, 1.24)
	not dangerous	298	5.9	31.8 (25.9, 37.6)		ref	63.5 (57.0, 70.0)		ref
	dangerous	2305	40.7	47.2 (43.8, 50.7)	**1.92**	**(1.43, 2.58)**	74.3 (71.8, 76.7)	**1.66**	**(1.23, 2.24)**
	very dangerous	2225	39.0	46.9 (43.3, 50.6)	**1.90**	**(1.39, 2.58)**	75.8 (73.4, 78.2)	**1.80**	**(1.35, 2.41)**
Tetanus	do not know	272	5.4	27.1 (19.5, 34.8)	0.69	(0.38, 1.25)	45.8 (36.6, 55.1)	**0.51**	**(0.30, 0.87)**
	not dangerous	186	4.1	35.1 (26.1, 44.1)		ref	62.4 (52.4, 72.4)		ref
	dangerous	2015	35.4	42.8 (39.2, 46.4)	1.38	(0.91, 2.10)	70.8 (67.9, 73.6)	1.46	(0.94, 2.26)
	very dangerous	3223	55.1	47.3 (44.2, 50.4)	**1.66**	**(1.11, 2.47)**	75.7 (73.8, 77.6)	**1.88**	**(1.22, 2.88)**
Pertussis	do not know	594	11.3	37.6 (32.1, 43.0)	0.97	(0.75, 1.26)	60.4 (54.4, 66.3)	0.80	(0.62,1.04)
	not dangerous	1245	22.4	38.2 (34.4, 42.0)		ref	65.5 (62.2, 68.8)		ref
	dangerous	2913	52.1	47.9 (44.6, 51.1)	**1.49**	**(1.24, 1.78)**	76.9 (74.7, 79.1)	**1.75**	**(1.46, 2.11)**
	very dangerous	829	14.2	47.2 (42.1, 52.3)	**1.45**	**(1.13, 1.84)**	76.0 (72.2, 79.8)	**1.66**	**(1.32, 2.10)**
Polio	do not know	228	4.2	28.6 (21.9, 35.2)	1.02	(0.59, 1.76)	46.6 (39.2, 54.0)	0.65	(0.39, 1.07)
	not dangerous	149	3.6	28.1 (18.9, 37.4)		ref	57.4 (47.3, 67.5)		ref
	dangerous	1362	24.8	45.9 (42.0, 49.7)	**2.16**	**(1.33, 3.53)**	72.9 (69.7, 76.0)	**1.99**	**(1.28, 3.10)**
	very dangerous	3895	67.5	45.9 (43.1, 48.7)	**2.16**	**(1.36, 3.44)**	74.5 (72.4, 76.6)	**2.17**	**(1.42, 3.31)**

Vaccine preventable illnesses		n	%	Coverage for series 6605111 %(±95%CI)	Odds Ratio series 6605111 (±95%CI)		Coverage for series 5505111 %(±95%CI)	Odds Ratio series 5505111 (±95%CI)	
Measles	do not know	391	7.2	33.6 (27.4, 39.8)	**0.70**	**(0.52, 0.93)**	58.0 (50.8, 65.3)	**0.56**	**(0.41, 0.76)**
	not dangerous	2489	44.4	42.0 (38.9, 45.1)		ref	71.3 (68.8, 73.8)		ref
	dangerous	2251	40.7	48.9 (45.2, 52.6)	**1.32**	**(1.13, 1.53)**	76.3 (73.8, 78.7)	**1.29**	**(1.10, 1.52)**
	very dangerous	475	7.8	45.1 (39.4, 50.8)	1.13	(0.88, 1.46)	70.1 (64.9, 75.4)	0.95	(0.73, 1.23)
Mumps	do not know	340	6.7	31.5 (24.9, 38.1)	**0.69**	**(0.50, 0.95)**	58.1 (50.2, 66.0)	**0.63**	**(0.45, 0.87)**
	not dangerous	2043	36.6	40.0 (36.7, 43.5)		ref	68.8 (65.9, 71.7)		ref
	dangerous	2513	44.6	48.6 (45.2, 51.9)	**1.41**	**(1.22, 1.63)**	76.0 (73.7, 78.2)	**1.43**	**(1.22, 1.68)**
	very dangerous	711	12.1	48.9 (43.6, 54.3)	**1.43**	**(1.12, 1.83)**	77.8 (73.9, 81.8)	**1.59**	**(1.24, 2.04)**
Rubella	do not know	372	7.1	35.0 (28.5, 41.5)	0.82	(0.61, 1.02)	58.2 (51.2, 65.1)	**0.68**	**(0.52, 0.90)**
	not dangerous	1988	36.2	39.7 (36.5, 43.0)		ref	67.1 (64.4, 69.9)		ref
	dangerous	2261	40.7	49.5 (45.9, 53.0)	**1.48**	**(1.29, 1.71)**	77.3 (75.0, 79.6)	**1.66**	**(1.43, 1.94)**
	very dangerous	939	16.0	46.6 (41.6, 51.5)	**1.32**	**(1.05, 1.67)**	77.7 (74.2, 81.2)	**1.70**	**(1.36, 2.15)**
Hepatitis B	do not know	359	6.5	34.1 (27.7, 40.4)	1.03	(0.67, 1.57)	58.9 (51.7, 66.2)	0.96	(0.62, 1.46)
	not dangerous	348	6.7	33.4 (26.6, 40.2)		ref	60.0 (53.4, 66.7)		ref
	dangerous	2077	37.1	45.6 (41.8, 49.3)	**1.67**	**(1.20, 2.32)**	73.5 (70.8, 76.2)	**1.85**	**(1.37, 2.49)**
	very dangerous	2842	49.7	46.5 (43.5, 49.6)	**1.73**	**(1.26, 2.39)**	74.7 (72.0, 77.4)	**1.96**	**(1.44, 2.68)**

CI: confidence interval. ref: reference group

BE, JU, TI, VD: not included in the analysis

3.12 Valais 1999 vs. 2003

3.12.1 Participation

Participation by parents of the toddlers improved from 58.4% in 1999 to 74.6% in 2003, with the increase due to the 27.7% of the contacts made per telephone (Table 17.1). Participation acquired via the first letter remained unchanged, but those acquired via the second recall letter decreased from 30.3% in 1999 to 19.5% in 2003. For children at school entry, the number of participating classes increased, but the overall percentage slightly decreased from 93.3% in 1999 to 92.0% in 2003. However, the number of submitted vaccination cards increased from 309 (55.2%) to 472 (76.6%). Despite the 100% participation from the selected classes and the increase in the number of submitted vaccination cards by the adolescents at school departure from 371 in 1999 to 590 in 2003, the overall participation decreased from 86.5% to 79.2%. Because HepB vaccination was recorded on a separate sheet of paper in 1999, and in some cases only these were submitted without the vaccination cards sheets (from 16 students), the n for HepB was 387 in 1999.

Tables 17.2.1-.2 display reasons for nonparticipation in the survey only in 2003, as this information was not collected for 1999. As seen in Table 17.2.1, the most prominent reason for nonparticipation by parents of toddlers is the failure to make personal contact with the selected family, where telephone numbers were not found for 55 (37.9%) households, no contact was made despite having the telephone number for 29 (20.0%) households and letters were not delivered to the family as they could not be found for 24 (16.6%) households. By the schoolchildren, 144 (23.4%) children at school entry and 155 (20.8%) at school departure did not submit their vaccination cards to the nurses. Many provided no reasons; for those who did, the most prominent reason is refusal to participate.

Table 17.1. Participation in the study by toddlers 24-35 months of age, and children at school entry and departure in canton VS in 1999 and 2003

Toddlers	1999		2003	
	n	%	n	%
Total children selected	604	100	570	100
Response:				
First letter	174	28.8	156	27.4
Reminder	183	30.3	111	19.5
Telephone contact	2	0.3	158	27.7
Total Responders	353	58.4	425	74.6
Nonresponders	251	41.6	145	25.4

School entry	1999		2003	
	1st grade		2nd grade	
	n	%	n	%
Number of classes	45		50	
Number of students	560		616	
Number of participating classes	42	93.3	46	92.0
Total number of vaccination cards	309	55.2	472	76.6
Total nonresponse	251	44.8	144	23.4

School departure	1999		2003	
	8th grade		8th grade	
	n	%	n	%
Number of classes	31		36	
Number of students	429		745	
Number of participating classes	29	93.5	36	100.0
Total number of vaccination cards	371	86.5	590	79.2
Total nonresponse	58	13.5	155	20.8

Table 17.2.1. Reasons for nonparticipaton from parents of toddlers selected for the survey in canton VS, 2003

Reasons for nonparticipation	n	%
No telephone number available	55	37.9
No telephone contact	29	20.0
Unknown, not found, moved away	24	16.6
No vaccination card available	9	6.2
Fundamentally against surveys	6	4.1
No time	6	4.1
Promised to send the requested information	5	3.5
No interest	4	2.8
Language barrier	3	2.1
Against monitoring by the government	1	0.7
No child in household	1	0.7
Other reasons	2	1.4
Total	145	100

Table 17.2.2. Status of vaccination card and reasons for card not being submitted, VS 2003

	2nd grade		8th grade	
	n	%	n	%
Status of vaccination card (VC)				
Submitted and checked	467	75.8	560	75.2
New card (vaccinated only 1-2 times, as indicated on VC)	1	0.2	10	1.3
Incomplete(missing info on some vaccinations)*	4	0.6	20	2.7
Not submitted	144	23.4	155	20.8
Total	616	100.0	745	100.0
Reasons for VC not being submitted				
Refusal of vaccination	0	0.0	5	3.2
Already vaccinated	1	0.7	2	1.3
Sick child	6	4.2	3	1.9
VC lost	9	6.3	4	2.6
Child not vaccinated at all	0	0.0	0	0.0
Parental refusal	10	6.9	21	13.5
Refusal to participate in the survey	27	18.8	23	14.8
Unknown	49	34.0	55	35.5
Other reasons	9	6.3	1	0.6
Child absent during examination	33	22.9	41	26.5
Total	144	100.0	155	100.0

2nd gr: n=472; 8th gr: n=590 (includes VC that were indicated as new or incomplete on the vaccination summaryforms as completed by the nurses)
* vaccination doses were intentionally left empty by the nurses, when compared to the information completed for the other students in the class.

3.12.2 Immunization coverage

Immunization coverage by the toddlers for Di, Te, Per, Hib, Pol and MMR decreased from 1999 to 2003, with significance for Di, Te, Per and Pol at 3 doses and for MMR at both 1 and 2 doses; at 4 doses, although not significant, the decrease is also evident for Di, Te and Pol, while there is an increase for Per and Hib (Table 17.3).

After removing the responses made through telephone contacts, differences in coverage levels remained significant only by MMR and Hib (Fig 1). In contrast to the toddlers, coverage estimates for all vaccines increased from 1999 to 2003 for the schoolchildren, as seen in Table 17.3. By children at school entry, the difference in Per coverage between the two years is significant at all doses, whereas Di and Te are significant only at 5 doses, Hib at 4 doses and MMR at 2 doses. For adolescents at school departure, the differences in Di, Te and Per coverage estimates between the two years are significant at all doses. For Pol at 6 doses, the coverage of 60.7% in 1999 decreased to 10.6% in 2003, whereas at 4 doses of Pol, coverage increased from 89.5% to 94.1%. MMR has

also significantly increased from approximately 30% in 1999 to 85% for 2 doses. This also applies to HepB for the 1st and 2nd doses, where it rose from 54% to 84%.

Table 17.3. Vaccination coverage of toddlers 24-35 months of age, children at school entry and departure in canton VS in 1999 and 2003

Toddlers : 24-35 months of age
n: 1999=353; 2003=425

	≥ 3 doses		≥ 4 doses	
	1999	2003	1999	2003
Diphtheria	**96.2**	**91.1**	88.2	83.3
Tetanus	**98.0**	**94.2**	88.9	84.3
Pertussis	**95.6**	**90.9**	82.7	83.5
Hib	93.6	90.5	78.7	83.6
Polio	**97.8**	**93.0**	87.0	83.3
	≥ 1 dose		≥ 2 doses	
Measles	**92.9**	**84.1**	**0.2**	**33.3**
Mumps	**92.6**	**84.1**	**0.2**	**33.3**
Rubella	**92.6**	**84.1**	**0.2**	**33.3**

School entry 1999: 1st grade (n= 309) 2003: 2nd grade (n= 472)

	≥ 3 doses		≥ 4 doses		≥ 5 doses	
	1999	2003	1999	2003	1999	2003
Diphtheria	95.5	96.1	89.9	92.2	**51.3**	**78.5**
Tetanus	97.7	98.3	91.2	93.9	**51.7**	**79.3**
Pertussis	**88.4**	**94.3**	**39.2**	**88.0**	**4.5**	**67.0**
Hib	75.2	77.3	**8.1**	**34.1**	-	-
Polio	96.3	97.8	94.3	90.9	72.5	69.0
	≥ 1 dose		≥ 2 doses			
Measles	92.4	94.5	**17.7**	**83.8**		
Mumps	92.0	94.5	**16.7**	**83.5**		
Rubella	92.7	94.7	**17.4**	**83.7**		

School departure 8th grade n: 1999= 371; 2003= 590

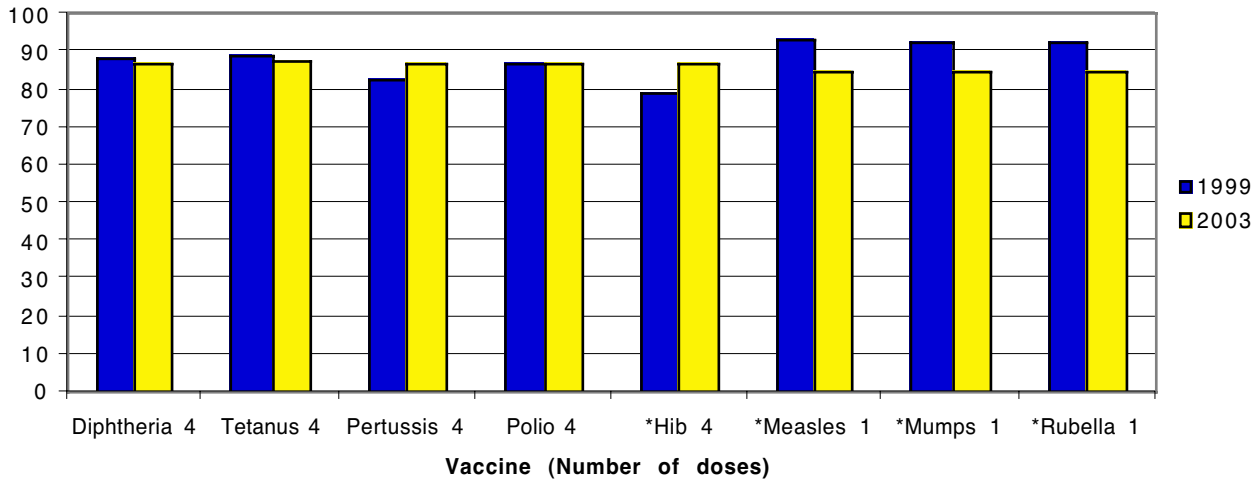
	≥ 3 doses		≥ 4 doses		≥ 5 doses		≥ 6 doses	
	1999	2003	1999	2003	1999	2003	1999	2003
Diphtheria	**89.5**	**94.5**	**81.6**	**93.1**	**56.3**	**86.0**	**15.8**	**56.3**
Tetanus	**89.7**	**96.9**	**82.8**	**95.0**	**58.9**	**88.0**	**17.3**	**57.1**
Pertussis	**82.8**	**91.8**	**6.9**	**65.3**	**0.9**	**35.3**	-	-
Hib	2.4	1.0	-	-	-	-	-	-
Polio	91.8	96.1	**89.5**	**94.1**	83.3	82.6	**60.7**	**10.6**
	≥ 1 dose		≥ 2 doses					
Measles	94.8	96.9	**34.2**	**84.3**				
Mumps	**93.5**	**96.3**	**30.4**	**84.5**				
Rubella	**89.1**	**96.6**	**29.0**	**84.5**				

School departure: 8th grade

	Hepatitis B	
	1999	2003
n	387	590
≥ 1 dose	**54.5**	**84.2**
≥ 2 doses	**53.8**	**84.1**
≥ 3 doses	52.2	51.8

Note: HepB 1999: n=387 includes
16 children who submitted info only on HepB
Bold: significant p< 0.05

Fig. 1 Vaccination coverage (%) of toddlers in canton VS 1999 and 2003 for families who responded to the first letter and reminder



When examining the coverage by different immunization series, the trend described above by the individual vaccines was also observed, as seen in Table 17.4. For toddlers, coverage for the 33333111 immunization series significantly decreased from 89.6% in 1999 to 83.0% in 2003. In contrast, coverage increased significantly by the schoolchildren between 1999 and 2003, at all the immunization series examined for both age groups, except for the 33333111 DTPPolHibMMR series by the children at school entry, despite the increase from 68.7% in 1999 to 75.7% in 2003.

Table 17.4. Vaccination coverage at different DTPPolHibMMR series among toddlers 24-35 months of age and children at school entry and DTPPolMMR for children at school departure in canton VS in 1999 and 2003

			% coverage at different DTPPolHibMMR series					
Age groups	Year	n	33333111	44443111	55050111	55553222	66050111	66050222
Toddlers	1999	346	**89.6**	77.5	-	-	-	-
	2003	422	**83.0**	77.0	-	-	-	-
School entry	1999	309	68.7	**32.3**	-	**0.6**	-	-
	2003	468	75.7	**71.0**	-	**47.5**	-	-
			% coverage at different DTPPolMMR series					
			3303111	4404111	5505111	5505222	6605111	6605222
School departure (without pertussis)	1999	371	**78.3**	**72.1**	**49.1**	**14.3**	**14.2**	**3.8**
	2003	568	**91.8**	**90.2**	**77.0**	**70.7**	**53.0**	**51.1**
			3333111	4434111	5535111	5535222	6635111	6635222
School departure (with pertussis)	1999	371	**73.3**	**69.3**	**47.6**	**13.6**	**13.9**	**3.5**
	2003	568	**89.3**	**87.9**	**75.6**	**69.5**	**52.1**	**50.2**

Bold: significant at p< 0.05

4. Discussion

During the 5 years of implementing this survey, much effort was expended to understand the existing infrastructures and compile the necessary information before the methodology could be adapted. Because one of the major goals of the study is to build a surveillance system to determine vaccination coverage in each canton by utilizing this study as a foundation, we attempted to use the existing infrastructure where possible to increase acceptance, ease the workload and maintain an acceptable budget. While this was achieved, data quality was compromised, particularly for the schoolchildren.

The methodology employed for the toddlers is an adaptation of the WHO recommended EPI cluster sampling method to determine vaccination coverage for children between 24-35 months of age, and has been conducted in the past years by many cantons independently [Henderson and Sundaresan, 1982; Schorr et al, 1993; Mütsch-Eckner and Schüpfer, 1995; Vranjes et al, 1996; Bachmann, personal communication, 2000; Maurer, 1997, 2001, 2003]. Changes in our survey from the established protocol to increase precision from ±10% to ±7% included sampling more clusters in each canton, selecting the number of samples proportional to the size of the selected cluster and increasing sample size. Because of the inclusion of a questionnaire and the larger sample size, effort to increase response rate, despite enormous attempts, was not as successful as what was achieved by the cantons in the previous years. Participation ranged from a low of 42% to a high of 83%. Comparison of responders and nonresponders revealed differences by urbanicity and nationality. Although urbanicity does not seem to be correlated with vaccination coverages, nationality is an important factor. Nonresponse adjustment and post-stratification of responders were made to account for this difference, but further research into characterization of nonresponders is warranted in order to

make the necessary statistical adjustments more effective. Finally, our results also showed that response rates correlate with vaccination coverage levels where children residing in cantons with participation of more than 70% having a significantly higher chance of being UTD than those residing in cantons where participation was below 60%. This clearly indicates that more efforts should be expended to decrease bias resulting from participation level in the study.

For the schoolchildren, the data collected have been compromised, such that comparison among the cantons and among the age groups within the canton is difficult. Because collaboration was sought with various organizations, potential variations in data collection method were high among the cantons. This is due to diverse organizational structures within the school health services and school authorities, different methods of data collection, the wide grade range for health exams, and the different vaccination policy, such as grade levels at which the routine health exams are mandated, vaccines that are offered in the school, whether or not school doctors are allowed to vaccinate at all, and whether or not HepB campaign is actively conducted in the school (Annex M.1, M.2). Our results showed that coverage levels are affected by participation in the study and the data collection methodology employed, with the latter being more influential. Additionally, the period during data collection and school vaccination may not have coincided, which consequently could yield inaccurate estimates. Catch-up shots administered by the family physicians would be missed in some cases. Moreover, problems encountered within the individual cantons also exacerbate the comparability problem, such as incompleteness of the vaccination summary form by some of the school doctors and nurses. Finally, by using the schools, the nature of the non-responders is not known. There could be many reasons, ranging from being recently vaccinated by their family physician, to downright refusal of any vaccines.

Moreover, coverage estimates obtained for all age groups could be an over-estimation of the actual coverages in the population, due to the high nonresponse rate and not taking into account valid vaccination doses. While some health studies show that there are not much differences between responders and nonresponders, other studies have contradicted this [Forthofer, 1983; Siemiatycki, 1984; Brambilla and McKinlay, 1987; Lasek et al, 1997; Fowler et al, 2002]. A recent hypothetical cohort study revealed that studies with low response proportions may actually be less biased than studies with high response proportions; however, vaccination coverage was not the target health variable in this simulation [Stang and Jöckel, 2004]. Confirming this, our survey did demonstrate that participation rates for the toddlers and children at school departure are directly related to immunization coverage levels where those living in cantons in which higher participation in the study was attained have a higher chance of being UTD. Contrary to this, two studies in Switzerland have shown data revealing differences in vaccination status of children with timeliness of response where those responding later or not at all are less likely to be up to date with the recommended vaccination scheme [Schorr et al, 1993; Golay, personal communication, 2003]. Although basic adjustment has been made to address nonresponse bias by redistributing the weights of nonresponders to responders and poststratification, more precise matching of the samples by nationality would better address this problem. Subsequently, by assuming that nonresponders behave similarly to responders, this naive nonresponse adjustment could also over-estimate vaccination coverage. Further over-estimation of immunization coverage could stem from the fact that the validity of vaccination doses was not evaluated before determining coverage levels due to lack of resources. A study in the United States where the required interval between doses were evaluated showed that 10.5% of children received at least one invalid dose of vaccine and that coverage estimates were decreased by 0.7% for 3 doses of polio, 6.5% for 3 doses of Hepatitis B and 3.4% for the 4443111 DTPPolMMR series for those between 19-35 months of age [Stokely et al, 2004]. Additionally, a large study in Sweden also

demonstrated that when dates of actual vaccination were recorded, postponed MMR vaccinations up to 1.5 years beyond the recommended 18 months accounted for about half the reported drop in coverage in 2001 [Dannetun et al, 2004]. Over-estimation of vaccination coverage could lead to missing kids and adding them to the pool of unvaccinated children, which could eventually lead to future outbreaks. Moreover, kids who have an invalid dose must be re-vaccinated, increasing not only health care cost, but also the risk of adverse reactions and injection discomfort.

However, coverage estimates obtained could also be an under-estimation. Although new vaccination cards were also accepted, no considerations were made for doses that were already completed but recorded elsewhere. Additionally, many foreigners participating in the study have missing information on vaccination completed outside of Switzerland. Hence, when lacking written confirmation for abroad or in Switzerland, assumptions that no other vaccinations were administered were made. This could lead to conservative immunization coverage estimates.

Despite these methodological limitations, the results can be interpreted with some confidence, as they corroborate coverage and significant associations obtained in the many studies already conducted in and outside of Switzerland [Minder and Steffen, 1991; Schorr et al, 1993; Bouvier, 1994; Mütsch-Eckner and Schüpfer, 1995; Vranjes et al, 1996; Masserey, 1997; Roth-Kleiner and Gnehm, 1997; BAG, 1999; Bachmann, personal communication, 2001; Golay and Sudre, 2002; Maurer, 1997, 2001, 2003; WHO: global summaries, 2003]. Despite their overall higher response rate, national coverage estimates remain similar between 1991-2003 in Switzerland (Table 18).

Table 18. Vaccination coverage of toddlers aged 24-35 months in Switzerland in 1991, 1998 and 1999-2003, with and without adjustments.

Vaccination	Year					
	1991	1998	1999-2003			
n	402	403	8729 [a]	8730 [b]	9347 [c]	9639 [d]
Diptheria						
≥3 doses	95.0	94.3	95.4	94.9	95.7	95.3
≥4 doses	71.1	71.7	83.6	83.7	81.6	84.9
Tetanus						
≥3 doses	93.3	93.3	95.9	95.4	96.1	95.8
≥4 doses	70.9	71.5	83.7	83.8	84.7	85.0
Pertussis						
≥3 doses	88.8	88.1	92.9	92.6	93.3	93.1
≥4 doses	-	68.2	81.3	81.2	82.3	82.7
Polio						
≥3 doses	94.8	92.1	95.3	94.7	95.6	95.0
≥4 doses	70.4	76.2	82.7	81.9	83.7	83.3
Hib						
≥3 doses	-	76.9	91.1	90.8	91.7	91.5
≥4 doses	-	47.4	79.3	79.2	80.4	80.8
Measles						
≥1 dose	83.1	81.4	82.3	81.4	83.1	82.3
Mumps						
≥1 dose	80.1	78.9	81.1	79.8	82.0	80.7
Rubella						
≥1 dose	79.6	78.7	80.8	79.0	81.7	80.0

1991: Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507. 1998: BAG. BAG Bulletin 1999; Nr. 20: 356-361.
a: estimates after weighting, nonresponse adjustment, poststratification. Includes only information from the vaccination cards.
b: data at face value, i.e. not weighted, no nonresponse adjustment, and no poststratification. Includes onlyinformation from the vaccination cards.
c: same as a, but includes vaccination information based on parental recall.
d: vaccination information from parental recall and vaccination cards, but does not include any adjustments or weights.

Moreover, the method used with the toddlers is an established method by the WHO and has been implemented in many countries worldwide to determine vaccination coverage. Although the validity of the administered vaccine doses was not investigated in our survey, the study by Stokely et al [2004] described earlier found that excluding invalid doses from vaccination coverage estimates had litle effect on the national coverage levels for the United States, except for HepB series; however, state coverage levels were affected. Furthermore, as data was collected via mixed modes (mail and telephone), nonresponse bias due to single mode, as shown by Fowler et al [2002] and Brambilla and McKinlay [1987], can be reduced while also increasing the response rate. Finally, although comparability may be compromised in our data, this is the first survey to examine vaccination coverage in every single canton.

Examination of immunization coverage at different series of DTPPolHibMMR for toddlers and children at school entry and of DTPPolHibMMR series for children at school departure reveals that children in these age groups are far below the immunization coverage, as recommended by the SFOPH and the WHO [Swiss National Immunization Survey, 2000]. When comparing coverage estimates attained and those needed to block transmission of the infectious agent at the individual level [Anderson and May, 1990], toddlers have achieved this critical coverage for Di and Pol, but are 12% below the minimum necessary coverage level required for Per, 10% for measles, 9% for mumps, and 4% for rubella. Except for Pol at 5 doses for the adolescents, schoolchildren appear to be drastically under-vaccinated, particularly those at school entry. Because of methodological difficulty encountered with the completeness of the vaccination summary form, the DTPPolHibMMR series for toddlers and children at school entry and DTPPolMMR for children at school departure were re-evaluated without including Per and Hib for comparative purposes. From this re-evaluation, it can be seen that catch-up shots are administered between the years examined, as coverage estimates at the 33030111 and 44040111 series are lowest for the toddlers, then increased, although still sub-optimal, by school entry and remains at this level at school departure; coverage levels then increase at the 5505111 and 5505222 series by the adolescents compared to the children at school entry. Coverage estimates are then drastically reduced when looking at 2 doses of MMR and the recommended 5 doses of Di and Te for children at school entry and 6 for school departure. This decrease in the already low immunization coverage indicates that more efforts are needed to be expended in order to reach the optimal goal for vaccination coverage set by the WHO to establish herd immunity and prevent circulation of the wild type virus [Anderson and May, 1990]. Herd immunity is especially important for those vulnerable in the population, such as infants, the elderly, and immuno-compromised individuals whose immune system is underdeveloped or weakened [Vitek et al, 2003]. Recent increase in outbreaks due

to importation of the infectious agent through faster and easier global mobility mandates high immunization coverage levels [Wilson, 2003; Gushulak and MacPherson, 2004].

As demonstrated in the numerous measles outbreak throughout Europe as described in the Introduction, containment of the various outbreaks in communities with low immunization coverage had been probably due to high coverage in the neighboring communities that have achieved herd immunity [van den Hof et al, 2002; de Melker, 2003; Yip et al, 2004]. In the case where parents continue to decline vaccination to avoid the potential vaccine associated risks, then a major epidemic outbreak could occur as the number of susceptible individuals will increase [Jansen et al, 2003; Wallinga et al, 2005]. This predicament had already happened in England with Per in the mid 1970's when coverage dropped from 80-90% to a 30% low [Ulmer and Liu, 2002; Baker, 2003]. Consequently, two severe outbreaks of whooping cough occurred, which resulted in more than 120,000 reported cases, with hundreds of serious complications and 28 deaths. Furthermore, Van der Wielen et al [2003] showed that a pertussis booster vaccination is needed as the antibody level declined after the age of 20 years.

Comparison of the Swiss national coverage for children between 24-35 months to the WHO global estimates and estimates from the WHO designated regions reveals, as displayed in Table 19, that coverage levels for toddlers for 3 doses of DTP and Pol residing in Switzerland between 1999-2003 are similar to those children in the European, American and developed regions, and are far higher than the global estimates and in the remaining regions. For measles at one dose, children in Switzerland are 6-8 percentage points below the European and the developed regional estimates [WHO: Global summaries, 2003]. Measles coverage for children in Switzerland is among the lowest of the selected European and industrialized countries in Table 19. Compared to its immediate neighbors France, Italy, Germany and

Austria, coverage for children in Switzerland is only higher than those from Austria for all vaccines (DTP at 3 doses, Pol at 3 doses and MMR at one dose) and from Italy at one dose of MMR.

Table 19. Vaccination coverage (%) of toddlers 24-35 months of age in Switzerland (CH) in comparison with coverage from the World Health Organization, globally and for the WHO designated regions, and selected countries

		WHO-designated regions								
	CH	CH	Global	EUR	AMR	EMR	AFR	WPR	SEAR	Developed
	1999-2003	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*
n	77.6 (±95% CI)	72'091	6'206'429	877'091	852'551	503'620	672'238	1'710'096	1'590'833	864'730
DTP3	92.8 (91.9, 93.7)	95	75	93	90	74	56	79	73	95
Measles	82.3 (80.9, 83.9)	79	73	89	91	73	59	71	70	90
Pol3	95.3 (94.6, 95.9)	94	75	93	90	74	56	79	73	91

	CH	CH	France	Italy	Germany	Austria	Greece	Portugal	Spain	U.Kingdom	Finland	Norway	USA
	1999-2003	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*	2002*
DTP3	92.8 (91.9, 93.7)	95	98	95	97	83	88	96	96	91	99	91	94
Measles	82.3 (80.9, 83.9)	79	85	70	89	78	88	87	97	83	96	88	91
Pol3	95.3 (94.6, 95.9)	94	98	96	95	82	87	96	96	91	95	91	90

n: in thousands; for CH, n: target population; for WHO, n: total population. CI: confidence interval.

* Source: WHO vaccines-preventable diseases: monitoring system. 2003 Global summary. WHO: Vaccine and Biologicals. Regions: EUR: European; AMR: Americas; EMR: Eastern Mediterranean; AFR: African; WPR: Western Pacific; SEAR: South-East Asia. All vaccination coverages are WHO/UNICEF national estimates, derived from country reports.

Except for Greece and Italy at one dose of MMR, the results obtained from our survey, indicating that toddlers from countries designated as from southern Europe (France, Portugal, Greece, Spain and Italy) have higher immunization coverage estimates for DTP, Pol, and measles than Swiss children, correlate with coverage as reported by these countries individually (Table 19) and the study conducted in 1992 by Bouvier et al [1994]. Because there were very few children in our samples originating from Greece, their impact on vaccination coverage was minimal. Furthermore, immigrants seeking asylum in Switzerland so far must have a mandatory health exam conducted by the "grenzsanitarische Untersuchungen" (GSU). This includes checking immunization status and vaccination when necessary. Every year about 2,200 foreign children aged 13 and under are vaccinated by the GSU, of which 0.3% are infants [Neyens, 2003]. In total about one quarter of the applicants

are permitted to remain in Switzerland. This could be one factor to help explain why foreign kids are better vaccinated for measles at one dose than Swiss kids; by the other vaccines, as more than one dose is necessary, the impact of the GSU on coverage could not be observed.

As presented in Table 18, comparison of coverage for toddlers for MMR at one dose and Di, Te, and Pol at 3 doses with those from 1991 and 1998 revealed that coverage has remained relatively unchanged; however, for Per and Hib at 3 and 4 doses and 4 doses of Di, Te, and Pol, coverage has increased, with the uptake of Hib being most apparent, climbing from 77% in 1998 to 91% in our survey at 3 doses and from 47% to 98% at 4 doses. The increased coverage for Per and Hib could be a result of more frequent use of combined vaccines. For Hib, as it is only included in the recommended vaccination plan since 1991, the large increase in coverage could be due to greater understanding of the dangers of the disease, reinforced by the inclusion of Hib in the combined vaccines. Since 1991, MMR remained a controversial vaccination, with coverage fluctuating at the low 80's.

Because coverage by the DTPPolHibMMR series are affected by the individual vaccines, any level of rejection or promotion of one vaccine will affect the overall estimate. By toddlers in the canton of SH, discussion with the CMO revealed that one pediatrician in this relatively small canton prefer not to immunize toddlers against rubella; catch-up shots for rubella are then administered during their attendance in kindergarten [Häggi, personal communication, 2003]. This position by the pediatrician, consequently renders the canton of SH with the lowest coverage for both DTPPolHibMMR immunization series examined, at 49.4% for the 33333111 series and 30.9% for the 44443111 series. On the other hand, cantons GE and TI have the highest vaccination coverages for both the 44443111 and 33333111 series. Because Di is mandatory in these cantons, it could account for the higher vaccination coverage for Di, and consequently Te, Per, Hib and Pol due to more frequent use of combined vaccines.

Although only Di vaccination is mandatory, many parents may forget that MMR is not; this uncertainty may prompt them to have their children immunized for MMR. A study in Italy demonstrated that mandatory vaccines have much higher coverage than those that are facultative, with many parents often mistakening the vaccines in these two categories [Bonannni and Berganini, 2002]. As mandatory vaccinations are found only in the French-speaking cantons (GE, FR, NE) and TI, coverage differs significantly by regions, with toddlers in the Italian- and French-speaking cantons being better vaccinated than their German counterpart. This difference is also observed in Germany where measles coverage in former western Germany, with its decentralized health care services, is lower than that in the former eastern side who had a centralized health care system and mandatory immunizations [Hellenbrand et al, 2003]. This phenomenon for TI must be cautiously interpreted as children in the first year of kindergarten, i.e. children between 3-4 years of age, were selected instead of those between 24-35 months of age as in the other cantons.

Furthermore, based on the results from the survey conducted in VS in 1999 and 2003, coverage for toddlers at the 33333111 DTPPolHibMMR immunization series have significantly decreased from 89.6% in 1999 to 83.0% in 2003. More precisely, vaccination coverage estimates for Di,Te, Per and Pol appear to be significantly higher for toddlers in 1999 than in 2003. However, after removing the responses from the telephone contacts, differences in coverage remained significant only by MMR and Hib. Acceptance for MMR appears to be slowly decreasing for VS, perhaps due to greater influence and popular use of alternative medicine, which selectively promotes vaccination, if at all. Diseases that are considered rare but often fatal, such as Di, Te, and Pol are recommended by some licensed homeopathic physicians, whereas those that are recognized as rather benign childhood diseases (MMR), or are considered to be indicated only for certain risk groups (Hib and HepB) are not recommended; by factions of homeopathic practitioners, all vaccinations are

discouraged [Lehrke, 2001]. In contrast to what has been recommended by some homeopathic practitioners, the President of the Swiss Homeopathy Society has confirmed that homeopathy is purely therapeutic, and that they do not oppose vaccination [Steffen, personal communication, 2004].

The gradual decline in MMR acceptance in VS could also be caused by the perception that measles, mumps and rubella are not particularly dangerous diseases, which naturally results in lower vaccination coverage. In our survey, only 50% of parents perceive measles, mumps and rubella as dangerous diseases. Furthermore, CAM practitioners recommend that children experience these childhood diseases (measles, mumps and rubella) to strengthen the immune system, although a newly published cohort study contradicted this by showing that children who were exposed to childhood infectious diseases before 18 months of age are more likely to develop atopic dermatitis [Ernst, 2002; Benn et al, 2004]. Compounding these perceptions of MMR are unsubstantiated claims that MMR is connected to autism, despite the many studies that have disproved this link [Wakefield et al, 1998; Taylor et al, 1999; Kaye et al, 2001; Madsen et al, 2002; Mäkelä et al, 2002; Owens, 2002; Ramsey et al, 2002; Wilson et al., 2003; DeStefano et al, 2004; Geier and Geier, 2004; Smeeth et al, 2004; Demicheli et al, 2005; Elliman and Sengupta, 2005; Afzal et al, 2006].

Regional difference in immunization coverage as revealed by the toddlers is still prevalent at the school level. Children at school entry level residing in TI have the highest coverage, followed by the French-speaking region and lastly, the German-speaking region. Perhaps as children have not received their catch-up shots for rubella, the estimates for the 33333111 and 444431111 series for the canton of SH remain low. Although TI only works with school doctors and do not vaccinate in the schools, according to the CMO the local pediatricians are young and very active; their enthusiasm ensures active participation in school health

promotion, and hence high vaccination coverage. While it was conducted in an adult population in Switzerland, Bovier et al [2001] confirmed that physicians play an important role in attaining adequate immunization coverage where lack of recommendation from the GP accounted for most missed vaccination opportunities. For VS, because students in the 2nd grade were recruited for the study in 2003 instead of the 1st grade as in 1999, this could most likely be the reason for the increase in vaccination coverage; this particularly applies to MMR as catch-up shots could be accounted for, along with cases where children prefer to be vaccinated by their private doctors than the school doctors.

By the adolescents, the regional difference is still apparent, but the magnitude has diminished. Examination at the cantonal level reveals that the canton of SZ has the highest vaccination coverage, regardless if it included examining the series with or without Per. This is most probably due to the fact that school nurses in canton SZ travel to every schoolhouse in the canton offering DiTe, DiTe-Pol, MMR vaccinations to students in the 1st or 8th grade. Furthermore school vaccination policy appears to play a more important role in coverage estimates. Because the school nurses in cantons VD, AG and SZ are permitted to vaccinate the children on their scheduled visits during the routine health examinations, the children in these cantons have the highest coverage estimates when examining the various DTPPolMMR series with 6 doses of Di and Te. On the other hand, at lower doses for Di and Te, cantons working only with school doctors have higher coverage. It appears that catch-up shots are administered effectively to teenagers by the school nurses in the schools; this phenomenon is also apparent for children at school entry for Di and Pol. However, for Hib for children at school entry, the reverse is applied because it is not offered in the schools as part of school vaccination, but are administered by the GPs / pediatricians, and offered only during the first 5 years.

Coverage for 3 doses of HepB range from a low of 7.5% in canton AI and 8.6% in SZ to a high of 88.3% in NW and 81.2% in VD. This large range indicate that HepB coverage varies, depending on whether or not a canton has already implemented a HepB vaccination campaign, the extent of the campaign, the HepB vaccine used [i.e. whether 2 or 3 applications are needed] and the school vaccination policy. In cantons AI and SZ, HepB vaccination is not offered in the schools during the routine health examinations whereby in cantons NW and VD, the school nurses vaccinate against HepB in the schoolhouses. Furthermore, there is a large HepB campaign in canton VD in the 7th grade; data for the survey was collected in the 8th grade. By the 1st and 2nd HepB dose is NW high while it is one of the lowest at the 3rd dose. The vaccination nurse in NW examines adolescents in February, and does not administer the 3rd dose until the beginning of the next school year. Since we collected the vaccination cards at the end of the school year, doses number 1 and 2 were quite high, whereby number three was not yet administered. Thus, this could also be a reason why one of our results showed that the odds of being UTD at 3 doses of HepB for adolescents in cantons where vaccination is permitted in the schools is lower (0.58 (CI: 0.46, 0.71)) than that of those living in cantons where vaccination is not permitted; the time of data collection differed for each canton and was not necessarily coordinated with the application of the final dose of the Hepatitis B vaccine, whether it be a 2 or 3 application scheme.

When interpreting the estimates for schoolchildren, caution must be taken since 3 or 4 different school grades were evaluated depending on the canton, i.e. by school entry is kindergarten, 1st, 2nd or 3rd accepted and by school exit, 6th-9th, the grades depending on when the cantons allow their school doctors to perform the school health exams. Hence, coverage by the 6th graders in AI is much lower than that from the older classes, especially with HepB. However, although the 3rd graders were recruited in BS, students in this canton do not have the highest overall coverage in this age group. Furthermore, there are many cantons that

remain either at the top as being best vaccinated or vice-versa; however, reasons for this are not superficially apparent, such as the low rubella coverage for SH. Especially important would be further discussions with the CMOs and school doctors to explore plausible explanations regarding differences in coverage due to the wide diversity in mentality and vaccination policies among the cantons. Only then can theories as to cantonal vaccination behaviors be more confidently hypothesized.

As also described in many other studies, vaccination coverage is affected by various factors, such as social and demographic factors, use of CAM, information availability, attitudes towards vaccination and the perceptions of the dangers of the disease [Masserey, 1997; BAG, 1999; Gellin et al, 2000; Impicciatore et al, 2000; Taylor et al, 2002; Luman et al, 2003; Chu et al, 2004; Cassell et al, 2006]. Our results confirm that having siblings, educational level of the mother, and the nationality of the child are all significant predictors of vaccination coverage. Having siblings, more specifically, toddlers with older siblings have a lower chance of being vaccinated for measles as compared to those who have no siblings. Single children have the full attention of the parents, whereas those who are the youngest, are more likely to be neglected as parents are pre-occupied with increased household responsibilities and family commitments. As mentioned also in earlier reports [Masserey, 1997; BAG, 1999], nationality of the child and highest level of education attained by the mother is a significant predictor of being UTD, particularly for measles. Toddlers of Swiss background have a less likely chance of being UTD for measles than those children from a foreign country and toddlers whose mother has attained a higher level of education are less likely to be vaccinated than those with a lower educational level.

In contrast, schoolchildren of Swiss background have a significantly higher chance of being vaccinated than their non-Swiss counterpart. By the measles vaccine is the odds reversed,

with the non-Swiss children at school entry having a significantly better chance of being vaccinated than the Swiss children. Like the toddlers, the odds of schoolchildren whose parents have a middle or high level of education being UTD with 1 dose of measles is lower than those whose parents educational level is rated low. However, by the immunization series and Di, Pol and Hib, the opposite is seen where the latter has a much higher chance of being vaccinated. Because coverage levels of Di, Pol and Hib are higher for Swiss children and children whose mothers have a higher educational degree, access to health care may have a strong influence on vaccination status. A study showed that refugees in southern Italy has a much lower immunity to diphtheria than native Italians [Chironna, 2003]. A recent study of newly arrived adult immigrants and refugees in Canada also revealed that 36% of the target population was susceptible to measles, mumps or rubella [Greenaway et al, 2007]. Additionally, an examination of more than 57 000 children between ages 5 and 12 years in Amsterdam showed that foreign born children who had been born abroad were most likely not to be fully vaccinated [van der Wal et al, 2005]. Furthermore, this phenomenon could also be influenced by the use of CAM. As CAM is only recently popular, parents whose education is rated as being in the middle and are parents of children at school departure still follow the vaccination plan as recommended by their physicians; hence, the odds of these adolescents to be UTD with the examined immunization series and Di, Pol and Hib are higher than those whose mothers' educational level is rated low and children at school entry.

For HepB, the reverse is true, where children of foreign background have a higher chance of being vaccinated than Swiss children; moreover, children whose mother's educational background is rated low has a higher chance of being vaccinated for HepB than those whose mother's educational level is rated medium or high. Since many foreigners in Switzerland originate from countries where HepB is more endemic, many families welcome the chance to be vaccinated for this disease. Swiss parents, on the other hand, do not believe that their

children fall into the HepB risk group. Furthermore, because asylum seekers must go for their check-up at the GSU, vaccination is made during these examinations, when necessary. Finally, many foreigners from the eastern European countries have very limited education opportunity, as compared to the Swiss where the majority of the educational background is at the middle level [SFSO, SAKE, 2004].

Highly influential on the level of vaccination coverage are 3 factors also observed in our findings: the use of CAM, attitudes towards vaccination, and perceptions of the dangers of childhood vaccine-preventable diseases. As seen in other studies [Masserey 1997; BAG, 1999; Robert Koch Institute, 2003; Cassell et al, 2006], parental use of CAM was strongly and significantly associated with vaccination status regardless of differences in the cantons or type of vaccines while the other factors varied randomly among the cantons. Approximately 41.7% of the parents of toddlers have used some type of alternative medicine, with a steady decrease to 37.9% for students at school entry and to 30.9% by school departure. The odds of being UTD at the 33333111 series among toddlers where CAM is used in the home is 0.38 (CI: 0.33, 0.43) times that of those toddlers in homes where only classical medicine is followed. This is especially true for infectious diseases perceived as less dangerous, such as MMR. Although no follow-up of one cohort was possible in this cross-sectional survey, it appears that as children are older, the influence of CAM on vaccination coverage declines, as its use is also reduced. For those who practice homeopathy more rigorously, there is an alternative vaccination scheme recommended by their homeopathic practitioner, where the number of doses and vaccines are reduced and the administration of the vaccines are postponed until the infant is older [Klein and Albonico, 2003]. With the rise in popularity of CAM [Eisenberg et al, 1998; Kessler et al, 2001; Marstedt and Moebus, 2002], the use of CAM is a crucial factor that must be addressed in order to deter the possibility of immunization coverage further declining in this population. A Canadian study showed that

only 12.8% of the students enrolled in a naturopathic university would recommend the full vaccination scheme to their patients, and 74.4% only partially [Wilson et al, 2004], due to concerns of unknown side effects and doubtful efficacy. Similar to those attending a chiropractic university, students attending these schools longer have significantly more critical view of vaccination [Busse et al, 2002]. Collaboration with the educational boards is vital to ensure that immunization is fairly and accurately represented in the curriculum.

With strongly significant association is the finding that the predominant language spoken in the region plays a crucial role in the immunization status of children residing in Switzerland. Toddlers and children at school entry residing in the French- and Italian- speaking regions are better vaccinated than those residing in the German-speaking region, despite more use of CAM in the former regions. In fact, toddlers residing in the French- and Italian-speaking regions whose parents use CAM have a significantly higher chance of being vaccinated than those in the German-speaking region. As mentioned earlier, perhaps the different childhood vaccination recommendation guidelines in each canton can confound these results. For example, 4 out of 7 of the cantons in the French- and Italian-speaking regions require that children be vaccinated for Di, but none of those in the German-speaking region has made that mandatory. Consequently, as cited earlier, because parents often mistaken the vaccinations that are categorized as mandatory or facultative, and will bring their children to be vaccinated since some will believe that all vaccinations are obligatory, toddlers residing in these cantons will be better vaccinated than those where no vaccinations are mandatory [Bonanni and Beganini, 2002]. This political factor, as well as other factors, must be controlled in a multivariate logistic regression to determine if there is really a significant difference between the different language speaking regions. Furthermore, the higher immunization coverage levels of toddlers in TI compared to those in the German-speaking region was also influenced by the fact that children 3-4 years of age, instead of the standard 24-35 months of age were

recruited for the study. By the children at school entry, this significant difference between linguistic regions could be affected by the school immunization policy, along with the efforts of the school doctors.

Contrary to this pattern, adolescents in the French- and Italian- speaking regions have a lower chance of being vaccinated for measles at one dose than those children in the German-speaking region. This could be due to the fact that, parents in the French- and Italian-speaking regions utilize more alternative medicine, than their German counterparts, where the use of alternative medicine is negatively correlated with measles uptake. As confirmed in this survey, adolescents from families where alternative medicine is practiced and reside in the French-speaking region have an odds of 0.63 times of being UTD for measles at one dose than those in the German-speaking region. For HepB, as vaccination campaigns are more organized and well publicized in the schools in the French- and Italian-speaking regions (5 from 7 cantons), adolescents in these regions have a significantly higher chance of being UTD for HepB than those in the German-speaking region (8 from 19 cantons), despite higher use of alternative medicine. Furthermore this significance could also be exacerbated by the use of cantonal employed school / LL nurses, in which cantons supplementing their health services with school nurses have an odds of 1.66 times of being UTD for 1 dose of HepB than the cantons without this supplementation.

Naturally, parents with negative attitude towards vaccination will less likely have their children fully vaccinated, as seen by Cassell et al [2006]. In our survey, the most significant predictors of a child being UTD with the recommended vaccination plan is if parents agree that they follow the doctor's recommendation, believe in the effectiveness of vaccination, and think that as many children as possible should be vaccinated for the benefit of the community. This pattern applies to children in all 3 age groups, with the magnitude of the association

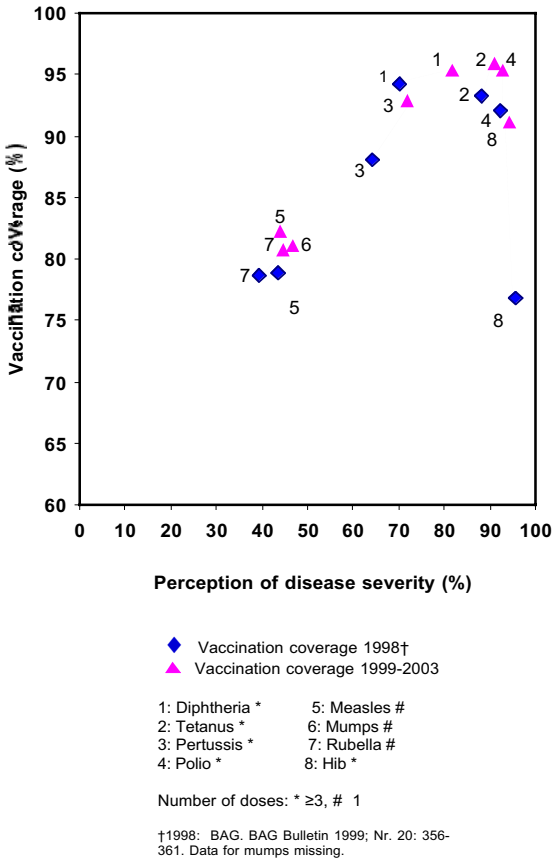
decreasing with increasing age. Because schoolchildren, particularly those at school departure, have had already received many of the recommended vaccinations, and vaccination is now only a very controversial topic, attitudes of the parents of these children are not as strong predictors of vaccination behaviors as those from parents of toddlers. Parents of toddlers must make a decision regarding immunization for their children with contradictory opinions and information being constantly expressed. The "Arbeitsgruppe für differenzierte Impfungen" encourages parents to delay recommended childhood vaccination, where the delay time varies with the vaccine [Klein and Albonico, 2003]. Measles, mumps and rubella vaccinations are only recommended for teenagers between 12-14 years of age when the respective diseases have not yet been contracted. It is hypothesized that suppression of acute diseases in childhood may induce chronic diseases in the future (Teixeira, 2002). The delay in immunization of these children could result in an epidemic, especially when there is a clustering of children who remain unvaccinated [Van den Hof, 2002; May and Silverman, 2003; de Melker, 2003]. Furthermore, Siedler et al. [2002] showed that more than 50% of measles cases in infants in Germany could be prevented if the 85% coverage for toddlers could be reached by the second, instead of third year of life.

With the success of vaccination, many of the childhood diseases prevalent before the advent of vaccination are no longer experienced, with small pox being eradicated globally [CDC/MMWR, 1999(b)]. This lack of experience with certain diseases and advancement in medical knowledge and technology support the illusion that certain diseases are no longer dangerous. Additionally, a study by Smailbegovic et al [2003] showed that parents perceived that having their child immunized with a particular vaccine was more risky than non-immunization. This particularly applies to measles and rubella as more than 50% of parents do not find these two diseases to be dangerous. In contrast, many parents perceive Hib as very dangerous; hence, these parents of toddlers are 8 times and parents of children at school entry

are two times more likely to have their children comply with the recommended vaccination scheme than those who perceive Hib as not dangerous, although Hib coverage is still sub-optimal. Children at school departure have the highest odds of being vaccinated for Pol as parents perceive it as more dangerous than any of the other diseases. Pol is also perceived as very dangerous by parents of the 2 younger groups. Extremely noteworthy is also the high odds of being UTD for those who responded that they do not know how to perceive the dangers of the certain childhood vaccine preventable diseases. This particular group could be parents who are less critical of immunization, and vaccinate their children simply because it is part of the routine.

Although we see that the magnitude of the perceptions of the dangers of certain diseases vary by age groups, when comparing the perceptions of parents of toddlers from this survey to that of those from the national survey conducted in 1998 by the SFOPH, perceptions of the diseases, as well as immunization coverage, have not changed much (see Fig. 2). There are, however, two exceptions. While coverage for Hib has drastically increased, the perception of the dangers of this disease remained the same. This increase in coverage is probably a result of the more popular use of combined vaccines, as is the case with Per, although the perception of the danger of Per has increased by 8%.

Fig. 2 Vaccination coverage (%) and perception of disease severity (%) of parents of toddlers 24-35 months of age in 1998 and 1999- 2003



Good information is an important aspect of obtaining high vaccination compliance [Gellin et al, 2000; Swennen et al, 2002]. Surprisingly, approximately 90% of parents of children in all 3 age groups did acknowledge the receipt of information regarding vaccination. Of these, on average, 67% are happy with the information they have, 18% are not, 7% did not know, and 8% refrained from answering. Our results also surprisingly reveal that parents of toddlers who have information about vaccination available to them are not as well vaccinated as those who have no access to this information. This also applies to children at school entry for measles. Perhaps this could be due to the fact that parents seeking information are more critical and concern about the type of information available, particularly about vaccination than those who do not seek any information. This phenomenon has been confirmed by Cassell et al [2006],

where mothers actively seeking information on MMR are more likely to be vaccination non-compliers than those who are more passive regarding this theme. In contrast, for children at school departure, receipt of information is a strong consistent predictor of being vaccinated. This could be accounted to the influence of the information from the school health officials. Additionally, approximately 20% of parents are not satisfied with the information available. Finally, toddlers whose parents are not satisfied with the available information are not so well vaccinated as toddlers whose parents are satisfied with the information obtained. This confirms that vaccination campaigns need to improve the type of information available to parents to restore the public's trust in vaccines and hence increase acceptance and immunization coverage. To ensure not only compliance, but also concordance, they should disseminate information in such a way that parents are actively involved and their views and concerns are respected [Vernon, 2003].

Our results also indicate that doctors are the primary resource for parents about information regarding vaccination, regardless if the parents need to request this information, as in many other studies [Masserey, 1997; BAG, 1999; Gellin et al, 2000; Swennen et al, 2002]. Because doctors are often highly regarded by their patients, many follow their doctor's advice despite their own hesitations [Kolasa et al, 2001; Leask et al, 2006]. Additionally, parents distinguish between their doctors and doctors in general, where they have more trust in their doctors than doctors in general [Casiday et al, 2006]. Zucs et al [2004] showed that among all the factors examined, the main independent predictors of non-immunization of preschool children from Bavaria, Germany were doctors advising against vaccination and those abstaining from giving advice.

Moreover, parents of schoolchildren desire more information from school health officials. Although many parents may wish that information from the media is reduced and that from

the health insurance is increased, scientists should strive to build a long-term relationship with these two groups. An analysis of the media coverage of the MMR controversy in Great Britain between January and September 2002 showed that the media misled the public over the MMR vaccine by focusing their reports on the possible link between MMR vaccine and autism and giving the same coverage for those supporting and contradicting the link; only 23% of the public were aware that the bulk of the evidence favored supporters of the vaccine [Hargraves et al, 2003]. Moreover, in addition to MMR, the negative impact of the media was clearly evident also during the controversy surrounding Per and smallpox vaccination in Great Britain [Fitzpatrick, 2004; Baker, 2003]. By working closely with the media and health insurance, we can ensure that accurate information are disseminated, particularly in times of disease outbreaks [Cookson, 2002].

4.1 Limitations

Because one of the major goals of the study is to build a surveillance system in each canton concerning vaccination coverage by using this study as a foundation, we attempted to use the existing infrastructure as much as possible in each canton to increase acceptance and ease the workload, while maintaining an acceptable budget. While all cantons do employ some method of checking the vaccination cards, information is recorded only enough to suffice for vaccine reimbursement. Unfortunately, this does not provide enough information for in-depth statistical analysis into vaccination coverage levels. This required that new procedures were created and adapted to the needs and resources of each canton. Our collaboration with various health organizations and school health officials in each canton have reduced the workload for ISPMZ substantially, but unfortunately, has also compromised the comparability of the results among the cantons. As described earlier, this variability is due to the different vaccination policy in each canton, such as the grade levels at which the routine health examines are

mandated, vaccines that are offered in the school, whether or not school doctors are allowed to vaccinate at all, and whether or not HepB campaign is actively conducted in the school (Annex M.1, M.2). For example, in many cantons school doctors can perform the routine health examination and vaccination card control anytime during the entire school year. Some cantons allow the school doctors the choices to examine the students either at kindergarten or 1st grade or at grades 7th, 8th or 9th. Because the study was coordinated with the routine school health examination so as not to overburden the school doctors, teachers and parents, comparability among the cantons was compromised. Moreover, in many cantons vaccination policies require that students be referred to their GPs for catch-up shots; this vaccination could not be assessed through the school health exams. In contrary, although some cantons allow the physicians to vaccinate in the schools, some physicians may prefer referring the schoolchildren to their GPs for catch-up shots. Comparisons of the immunization coverage for schoolchildren where vaccinations are permitted in the schools and where they are not should be done with caution, despite significant associations. HepB coverage is especially influenced by such policies as some cantons expend much resource to educate their students about HepB while other cantons spend very little or nothing at all. Additionally the period during data collection and school vaccination may not have coincided, which consequently could yield inaccurate estimates. Catch-up shots administered by the family physicians would be missed in some cases. Completion of the vaccination summary form by the school doctors and nurses also added to the problem as some health officials also checked for Per and Hib during their examination of the vaccination cards while others ignored these two vaccines. After correcting for this error, data for Per and Hib were incomplete for 2 classes from canton AI for children at school entry and Per for 5 (3 from AI and 2 from GR) for those at school departure. In BS information for these two vaccines was missing for 24 children at school entry and 57 at school departure, in addition to single cases in cantons SG, SH, TI, ZG and ZH where this information could not be assessed from the vaccination cards. As evident in

our results, coverage estimates for teenagers were also associated with mode of data collection; adolescents where nurses collected the data have a higher chance of being vaccinated than those in cantons where doctors aided in data collection. Perhaps higher coverage could be accounted to better data collection by the cantonal employed school / LL nurses as they have more time than the school doctors for the evaluation. Furthermore, by using the schools, the nature of the non-responders is not known. There could be many reasons, ranging from being recently vaccinated by their family physician, to downright refusal of any vaccines since those kids who do not want to be vaccinated will normally not submit their vaccination booklets to the school health officials.

Moreover, clear communication between ISPMZ and the school health officials must be improved to avoid any misunderstandings. Although collaboration with the LL nurse in the canton of JU was very simple and efficient with telephone inquiries from ISPMZ throughout the school period to inquire about the process of data collection, the vaccination information delivered at the end of the school year was not adequate to determine vaccination coverage by vaccination per dose due to misunderstandings. Consequently, despite utilizing all the available information, ISPMZ was not able to reconstruct the necessary information; hence, vaccination coverage from JU for schoolchildren was missing.

Finally, the use of the vaccination summary form has simplified data entry, but other work arose due to unforeseen problems. According to the wish of the CMOs to increase compliance among the school doctors by reducing their work, school doctors should be allowed to check one box if the child is UTD for all vaccines; hence, it would not be necessary to complete the individual boxes for each vaccine if the child is UTD. Although the SFOPH recommended vaccination plan was attached to the summary form, it was nevertheless not defined enough for the school doctors. Some doctors defined UTD as having 4 doses for Di, Te, Per, Pol and

Per and one for MMR for school entry and for the children at school departure, UTD was defined as 5 doses for Di, Te, Pol, 0 for Per and two for MMR. We contacted all the school doctors to confirm the nature of UTD if the UTD boxes were checked. Moreover, because Per and Hib do not apply to the children at school departure and are not vaccinated in the schools, some school doctors did not even control for the number of doses for these two vaccines in the vaccination booklet.

Some of these uncertainties along with the unknown nature of nonresponders have been addressed in the study repeated in VS. The pilot study conducted in 1999 in VS served as a good platform on which to change data collection methods to improve data quality, ensure comparability and improve the chances for sustainability. The collaborators in 1999 were eager to join efforts once more, with many ideas to overcome some of the problems encountered in the pilot study. For VS, the nurses from the LL were requested to make sure that all kids are represented on the vaccination summary form, and reasons for not vaccinating a child or checking the vaccination card should be clearly indicated. The nurses were also requested to complete the form fully, regardless if the child is vaccinated according to the recommended SFOPH childhood vaccination plan.

In the case of the toddlers, difficulties encountered originated from other areas. For example, in the canton of NE as all three age groups were sent the same letter at the same time, chaos broke for the first letter since placing the returned answers in the correct age group was sometimes impossible. In the canton of VD, where the “Bureau Vaudois d’Adresses” performed the sampling and sent the first letter, the mistakes were not realized until too late. The first set of letters was sent to the wrong families as children of all ages were sampled, instead of those between 24-35 months of age. After this error was noticed, a second sampling was done. It was not until the completion of the survey was it realized that the sampled

population was not representative of the general population in VD. The sampled population consisted of 60% foreigners, whereas the general population had only 30%. After inquiry into the sampling method of the BVA, it was discovered that simple random sampling was not used, but the method employed was similar to proportional to the size of the different ethnicity, based on the judgement of the person in charge. To exacerbate this error, the selection of parents within the different ethnicity were not random, but were more systematic where those first on the list were always selected. The last convenience utilized by BVA for selection of samples could unknowingly select the same families for various different studies, with negative consequence for those depending on their participation. Hence, despite the huge efforts expended by ISPMZ to increase the response rates, participation from parents of toddlers in canton VD remained at a modest 68%.

Among the 3 different methods used to collect data for the schoolchildren, coordination with the school health services supplemented with cantonal employed or LL nurses was most efficient and clear. For data entry, the vaccination summary form was easy to interpret and clearly more completed. Furthermore, participation rate was distinctly higher. Although many school doctors agreed to help out with the study, one refusal could lower the response rate dramatically, particularly in the smaller cantons. Sustainability by cantons would be most feasible by collaborating with cantonal employed school or LL nurses supplementing school health services. Since many cantons do not offer such services, collaboration with school doctors would be sought next where feasible. However, the vaccination form would have to be drastically simplified to reduce the amount of work for these doctors in order to ensure compliance and acceptance.

By the toddlers, not many methods exist by which to reach the toddlers. The method used for the majority of the cantons, in which help from municipal halls were sought, was feasible,

although quite labor intensive. In three cantons where there is a single registry for all residents in the canton, sampling by simple random sampling was done, and direct contact with the family was taken. With help from Dr. Philip Smith from the National Immunization Program, Centers for Disease Control and Prevention, we employed a self-weighting sampling design for data collection of toddlers in 2002, which eased the sampling procedure, simplified weight calculations and produce accurate estimates and confidence intervals [Smith, personal communication, 2001]. In short, using this sampling design each child will have the same weights regardless of the cluster to which the child belongs [Levy and Lemeshow, 1999]. A comparison study between telephone and written surveys to assess adolescent immunization coverage rates showed that combining both methods would maximize the data collected, increase response rate while maintaining cost and attaining accurate vaccination coverage rates [Peddecord et al, 2004]. An additional improvement that would ease data collection methods for toddlers would include a procedural change in cantons where Di or Te vaccination is mandatory. Because a method must exist to check that all toddlers are vaccinated for either Di or Te, the vaccination card can be simultaneously copied or a vaccination form completed for the district, as in canton GE. No additional surveys would then be needed for the toddlers in these cantons; adaptations or modifications to an existing infrastructure are ideal if comparable data can be collected, and should be seriously considered as a step towards establishing a sustainable and comparable vaccination surveillance system.

Nonresponse continues to be a major obstacle in this study for both schoolchildren and toddlers. As aforementioned, this could be addressed adequately for the schoolchildren with the help of the school nurses in VS, but the problem remained difficult to resolve with the toddlers. Personal communication with Dr. Sudre from GE indicate that the addition of a questionnaire to the routine letter decreased the usual response rate of 70% down to about

50% after the first letter, when comparing the participation in the survey with the routine data collection by the Health Department in GE to monitor vaccination coverage [Sudre, personal communication, 2003]. This effect is also confirmed when one compares the usual 80-90 % response rate conducted in other cantons in previous years [Schorr, 1993; Vranjes, 1996; Maurer, 1997, 2001, 2003]. In our current survey, we also showed that toddlers residing in cantons where participation of more than 70% could be achieved had a higher chance of being UTD with the recommended immunizations. Perhaps more parents who are willing to participate in the study have a more positive attitude towards immunization. Furthermore, accessibility to copiers could also hurt compliance with the study. We have experienced from many parents, particularly those living in the rural regions, that the process of going out and making a copy of the vaccination card had also hindered them from immediately returning the completed questionnaire. By repeating the study in VS in 2003 and collecting only vaccination cards, it has been confirmed that participation from the parents can be greatly increased by: dropping the questionnaire, hiring telephone assistants to contact parents of foreign background, contacting GPs when parents do not have the vaccination cards available, increasing the number of telephone attempts, and using more resources to find missing telephone numbers.

As most school doctors, nurses, CMOs, and teachers are willing to assist in the study, more strategies are needed to utilize their assistance effectively, perhaps even paying for their assistance, if need must be to enhance data quality. For example, in canton NW, the vaccination nurse was willing to collect all available vaccination cards and bring them home and complete the vaccination summary form, if we could have paid her for this extra effort. The time and effort spent to contact the schools and to get compliance from teachers, directors, and parents could have been saved, while increasing our meager response rate of 20% in canton NW considerably if we were to use this strategy. Moreover, some school

doctors have directly contacted ISPMZ to complain that participating in the study required much time and that they should be monetarily reimbursed for their efforts.

Strategies to combat nonresponse should be investigated and carefully implemented. By this study, the high nonresponse rate, especially by schoolchildren in cantons ZG, OW and NW, and for vaccines where coverage levels were much lower than the assumed 80% prevalence, had compromised the results considerably. Some confidence intervals were much wider than the desired ±7% precision that was used to calculate the sample size, particularly by schoolchildren in the aforementioned cantons where participation was meager at 11.8%, 20.2%, 29.2% at school entry and 8.6%, 13.0%, 20.5% at school exit, respectively.

Nonresponse bias can also be handled statistically by using nonresponder adjustment, imputation and poststratification. Use of these methods should yield estimates closer to the true population estimate and more accurate confidence intervals. Basically, by nonresponder adjustment, it is assumed that the sample is representative of the general population and that behavior of those who do not respond will be similar to those who do respond. Hence, it is possible to distribute the results among the population to get appropriate population estimates [Korn and Graubard, 1999; Levy and Lemeshow, 1999]. Imputation involves using data obtained from the survey to fill in missing information and poststratification entails adjusting the weights of each individual child so that the overall proportion will be equal to that obtained in an independent authoratative resource, i.e. the census figure [Brick, 1996; Smith, personal communication, 2001]. Before the analysis of the results with the toddlers, these statistical procedures were used, with conservative imputations for gender and nationality based on names of the children selected for the study. Many parents claimed not to have refused or missed any opportunities to have their children vaccinated. Further inquiries, when possible, requested that the parents clearly state the number of shots for the recommended

number of doses for each vaccine. By the toddlers, parents who are too busy to participate in the study or have no interest in the topic also confirmed that their children never missed a doctor's appointment for vaccination. Moreover, those who were clearly against or sceptical about vaccination were very open about their opinions on the phone. For comparative purposes, Table 18 presents coverage estimates resulting from different statistical manipulations. As can be seen, there is at most a 2.0% difference between these different procedures, with data using weights and adjustments, along with parental recall yielding slightly higher figures than when taken at face value, i.e. without weights, imputation or adjustments. Based on many statistical analysis, those using nonresponse adjustment and poststratification will yield estimates that are closer to the true population estimates with appropriate standard errors [Korn and Graubard, 1999].

4.2 Conclusions

Vaccination coverage of children in Switzerland has not reached the optimal level to establish solid herd immunity, but it has reached a threshold where major outbreaks are avoided, but not small minor ones (Wallinga et al, 2005). When infection is re-introduced, an outbreak can occur in the communities with low coverage. This can be clearly seen with the numerous local measles outbreaks throughout Europe, as described in the Introduction. These outbreaks usually affect unvaccinated, or not fully vaccinated children who due to common philosophical, religious and / or social bonds are clustered geographically [Smith et al, 2004].

Future vaccination campaigns need to more clearly define their target population as there are many factors associated with immunization coverage. They include socio-demographic variables (such as nationality, number of older siblings and maternal level of education), parental attitudes and perceptions of disease and healthcare, type of information available, use

of complementary / alternative medicine, relationship with healthcare providers, all influenced by regional differences in local and national immunization policies. The interplay of these factors results in varying degrees of impact on coverage level.

Campaigns directed towards parents should include strategies that are informative, personal and compelling, and yet transparent, explaining also the differences between coincidental and causal relationships while communicating risks and addressing vaccine safety concerns more effectively [Bellaby, 2003; Offit and Coffin, 2003]; moreover, strategies should treat parents as active partners, rather than passive recipients of information, respecting their intentions to protect their children's health [McMurray et al, 2004]. A working relationship between the media, health care professionals and scientists would benefit everyone immensely with the correct information being produced and used. Furthermore, campaign strategies should also include educating / re-educating doctors or healthcare providers about the benefits of immunization and the basic principles behind vaccinology, immunology and herd immunity. Furthermore, many healthcare providers would like more information and resources to be easily available to them to help refute the anti-vaccination claims and alleviate parental concerns especially regarding vaccine safety without compromising their credibility, as many parents re-instate their trust in their GPs [Petousis-Harris et al, 2004; Casiday et al. 2006; Petousis-Harris et al, 2005]. In one study, many health professionals in Wales were not aware of or do not use the good written resources available about the second dose of MMR [Petrovic et al, 2001]; 3 other studies showed that healthcare providers lacked substantial knowledge about the recommended immunization schedules and vaccine contraindications [Cohen et al, 2003; Petousis-Harris et al, 2004; Petousis-Harris et al, 2005]. With greater understanding, health care providers can easily promote vaccination and persuade their sceptical patients toward this goal. Moreover, as the use of CAM increases, collaboration with educational

institutions is important to ensure that immunization is accurately represented in the curriculum [Busse et al, 2002; Wilson et al, 2004].

Utilizing the findings from this study, a new vaccination campaign in Switzerland must prepare new information directed especially towards Swiss parents and who reside in the German-speaking region. This new information should address the increasing negative attitudes toward vaccination, concerns about possible adverse effects, perception that childhood vaccine-preventable diseases are not so dangerous, and contradictory information provided by CAM practitioners. Additionally, vaccination policy should be carefully constructed as it significantly affects vaccination coverage. Since more parents consistently would like more health information from school officials, health authorities should use this invaluable opportunity to distribute information during the school years.

5. Future research

As the controversy over vaccination will only grow, more research into this topic should be invested. Areas that deem further investigation include:

1. Knowledge, attitudes and perceptions of physicians towards vaccination, especially in light of the increase influence of complementary / alternative medicine. As physicians are the most important resource for parents concerning vaccination, and they are responsible for immunization in their practices, hospitals and health clinics, it is especially important to understand their views, knowledge, attitudes and opinions not only about current vaccination policies, but also vaccination in general [Petrovic et al, 2001; Seid et al, 2001; Milledge et al, 2003]. A recent study showed that many physicians' knowledge regarding catch-up regimes and contraindications are minimal, with more errors occurring when the children are older and immunization recommendation plans are more complex [Cohen et al, 2003]. Studies of health professionals in Germany and New Zealand confirmed that physician's uncertainty in assessing contraindications correctly and lack of knowledge were important reasons for insufficient vaccination rates [Schupfner et al, 2002; Petousis-Harris et al, 2004; Petousis-Harris et al, 2005]. Furthermore, Bovier et al [2001] also demonstrated that lack of physician's encouragement accounted for most missed vaccinations in the adult population in Switzerland. A survey of school nurses and personnel in the US showed that vaccination exemptions were more likely to be given to children attending schools where nonmedical personnels were responders, and those who hold disease susceptibility and severity and vaccine efficacy and safety as low, have less confidence

in local and state department, have consulted with an alternative medicine practitioner, or use few professional organizations or government resources for vaccine information [Salmon et al, 2004]. A current study in Switzerland examined vaccination behaviours of physicians in Switzerland [Posfay-Barbe et al, 2005]. The authors showed that pediatricians and physicians who were not pediatrications (nonpediatricians) vaccinate differently, with a significant proportion of nonpediatricians twice unlikely to follow the recommended Swiss vaccination plan for their own children. These groups of nonpediatricians would also more likely to postpone DTP and MMR vaccinations and refrain from using combined vaccines, despite their scientific training and education.

Qualitative questionnaires and/ or personal interviews with general practitioners and pediatricians would provide more in-depth understanding of the knowledge, attitudes and perceptions of this critical group. If necessary, further education into vaccinology and immunology with focus on contraindications and vaccines, along with current popular perceptions of immunizations and reasons for anti-vaccination should be integrated during the medical training year or as a refresher course for practicing physicians. The information ascertained from the interviews with the physicians will help plan vaccination campaigns to increase immunization coverage.

2. Knowledge, attitudes and perceptions of parents in Switzerland towards vaccination. Although this was also examined in the current survey, a closed structured questionnaire was used. Focus groups or in-depth open-ended questionnaires of parents with opposing views about immunizations (supporting, waivering, postponing and declining) could provide more essential information towards planning vaccination campaigns [Ramsey et al, 2002; Swennen et al, 2002; Taylor et al, 2002; Smailbegovic et al, 2003; Cassell et al, 2006; Tickner et al, 2006]. A recent telephone survey in

Sweden found that parents postponing MMR are different from those who abstain from vaccinating their child [Dannetun et al, 2005] while another study in Scotland [Friederichs et al, 2006] demonstrated that levels of economical deprivation affect vaccination coverage and time at vaccination where those most affluent either vaccinate their children promptly or not at all; hence different strategies would be needed to target these parents successfully. Equally important would also be to determine the extent of parental refusal towards immunization, i.e. if this negative perception pertains only to certain immunizations, combination vaccinations or all immunizations in general. Primary barriers to vaccination for parents are concerns of vaccine safety, distrust in the government, growing distrust in the medical authority and prior experience with vaccine adverse effects [Allred et al, 2004; Gust et al, 2004; McMurray et al, 2004]. Because of the multi-cultural and language diversity embedded in Switzerland, it would be critical to differentiate parental views and perceptions among the different regions. Our study also confirmed this phenomenon, as toddlers and children at school entry residing in the French- and Italian-speaking regions in Switzerland, are better vaccinated than their German-speaking counterparts; adolescents residing in the former regions, on the other hand, have higher coverage. Additionally, a recent publication showed that acceptance of immunization among Swiss mothers living in Geneva depends on their level of education, use of CAM and perception of individual control over the health of their family [Burton-Jeangros et al, 2005]. Furthermore, more effective communication of immunization implies that new and existing information must reworked so that it can be integrated into parent's context of their individual situation and level of understanding [McMurray et al, 2004]. Limited resources and funding could be more adequately allocated to achieve effective results.

3. Patterns of complementary / alternative medicine (CAM) use and its influence on vaccination in Switzerland. Because the use of CAM has become increasingly popular among consumers [Eisenberg et al, 1998; Kessler et al, 2001; Marstedt and Moebus, 2002] and GPs [White et al, 1997; Marstedt and Moebus, 2002], with often opposing views as those supporting vaccination [Busse et al, 2002; Robert Koch Institute, 2003; Wilson et al, 2004], it is important to understand the level of its impact on immunization. In-depth investigations from other countries have also shown the difference in perceptions of immunization by different groups of CAM practitioners [Ernst, 1997, 2002; Lehrke et al, 2001]. Moreover, about one third of the visits to homeopathic practitioners or naturopathic doctors are children and adolescents; however only half of those CAM practitioners participating in the study have any formal pediatric training, with most not actively recommending immunizations [Lee and Kemper, 2000]. Furthermore, a current survey in canton VD, Switzerland, confirmed that children whose main healthcare providers are homeopaths are less likely to be vaccinated against MMR than those whose providers are certified doctors or pediatricians [Masserey et al, 2006].

   Further research into CAM, its prevalence, and especially influence on vaccination in Switzerland needs be done. Qualitative questionnaires and/ or personal interviews targeting this group would be critical for evaluating their attitudes and influence on vaccination. As seen in our study, the influence of CAM practitioners varies, depending on the linguistic region and field of specialization. A comprehensive list outlining the geographical location of CAM practitioners and their specialization would aid in differentiating and understanding this difference.

4. Analysis of coverage by validity of vaccination doses and / or age-appropriate vaccination since coverage estimates could be an over-estimation and timely vaccinations can protect children as early as possible and prevent disease outbreaks. As mentioned earlier, the study by Stokely et al. [2004] has shown that coverage estimates decline between 0.7% to 6.5% when the validity of the doses are taken into account. Furthermore, another study has revealed that by the age of 24 months, 9 out of 10 children will have received at least one dose of vaccine outside the recommended age ranges [Luman et al, 2002]. Hence over-estimation of coverage will leave many of these kids unprotected. A study in Germany calculated that if the current measles coverage of 85% can be achieved in the second instead of third year of life, then more than 50% of measles cases in 1 year old children could be prevented [Siedler et al, 2002]. A recent publication from the canton of Basel, Switzerland, also confirmed that when examined by doses, coverage level was high, while when examined if vaccinations were timely made, coverage level dropped significantly [Heininger and Zuberbühler, 2005]. This information should and could be easily assessed in the next cycle to determine vaccination coverage of children in each canton. Date of birth and dates of all vaccine administration for each child must be recorded at time of data collection.

5. Greater understanding of the level of population immunity in Switzerland. A recent publication showed that a minimum vaccine coverage of 80% at the second birthday in the United States may be sufficient to prevent measles transmission among preschool-aged children if population immunity is ≥ 93% among persons ≥ 6 years of age [Hutchins et al, 2004]. This coverage level varies by the age group and depends on the immunity of the target population, vaccination requirements and contact rates among children during preschool-aged years, along with contact rates with schoolchildren and

adults, their population immunity and the risk of introduction of measles from sources outside the preschool-aged population. A household contact study, as conducted by Arbenz et al [2005] would be useful to calculate vaccine effectiveness. Knowledge of the minimum vaccine coverage will aid in achieving and maintaining disease elimination while assessment of the population immunity will also help in evaluating epidemiological effects of the existing vaccines and new vaccines [de Melker, 2003]. This information should also be assessed for Switzerland.

6. More in-depth investigation into the impact of nonresponder bias, timeliness of response to survey, and mode of data collection on vaccination coverage in Switzerland. Although there has been research documenting the influence of these factors on immunization coverage in the USA [Smith et al, 2005; Salmon et al, 2006], there is not enough information in this domain for Switzerland. While time at and mode of participation in the survey will be important in determining effective methods of data collection, recording reasons for nonresponse, and vaccination status of these children, will be imperative to investigate its effect on vaccination coverage obtained from participants; more detailed nonresponder adjustments could be made in future surveys. Additionally, the prevalence of mobile telecommunication in the Swiss population also needs to be calculated, since more families, particularly foreigners, rely on them as the sole source of contact. Greater understanding of the aforementioned factors will aid in more applicable statistical adjustment and improved data quality, such as those implemented in the National Immunization Survey [Smith et al, 2005].

6. Practical Recommendations

6.1 To increase vaccination coverage

Based on these preliminary results, a few recommendations to increase vaccination coverage and for immunization campaigns could now be drawn:

1. The easiness to obtain vaccination does affect immunization coverage, particularly at school departure and for vaccines Per and MMR, with possibly higher coverage estimates for the cantons where immunization is offered in the schools and those with cantonal employed school or LL nurses to supplement the school health services. School health services could be a direct source of information to the parents, since more parents rely on schools for information as their children get older. An emphasis on the importance of prevention to the adolescents in the school would also help in raising awareness. Additionally, a uniform method of vaccine reimbursement and distribution would decrease confusion [Schmitt, 2002]. Immunization policy and school health guidelines need to be adapted to the present conditions to achieve higher vaccination coverage. A recent study in the United States revealed that school vaccination requirements can substantially increase vaccination coverage among students subject to the law (Averhoff et al, 2004). Furthermore, many of the well, organized school health services in Switzerland have coverage information detailed by local schoolhouses and zip codes; areas with low coverage could be easily identified and efforts to increase immunization acceptance focused.

2. Clear, but yet compelling information is very critical to immunization acceptance in the current society. Vaccination campaigns should directly address parental concerns while

discreetly responding to false allegations purported by the anti-vaccinators, whether it be through publications or in the Internet [Spier, 2002; Wolfe et al, 2002]. Strategies need to be implemented to convert the 44% comprising of those who have not received information regarding vaccination, are dissatisfied with the information received, or have no interest in the topic. Because parents are weary of the types of information shared by the media, this form of information is less desired. However, as a strategic maneuver the scientific community should also begin to build long-term relationship with the media so that accurate information is disseminated, especially in times of an outbreak. Such steps can prevent the tragedy that was seen with the rotavirus vaccine in the US, as a balanced portrayal of vaccines with its risks and benefits may avoid the sudden shifts in the media and public reaction and lend credit to the information distributed [Danovaro-Holliday et al, 2002]. Moreover, as more parents assess the Internet for information regarding vaccination, accurate and compelling information in support of vaccination while addressing parental attitudes and perceptions, in particular vaccine safety and efficacy should be easily accessible. After utilizing the MMR web based decision aid which provided numerical and graphical evidence of the risks associated with the diseases alongside with potential risks associated with the vaccines, many parental attitudes towards MMR vaccination had improved significantly [Wallace et al, 2005].

3. Healthcare providers also need to be targets of vaccination campaigns as many parents rely on these providers, and still prefer them to other resources, for information regarding vaccination. Despite their concerns regarding vaccine safety, a recent study by Leask et al [2006] demonstrated that mothers whose children are fully vaccinated reasserted their support for immunizations by deferring to authority figures, particularly their GPs. Reviews and revised medical education need to clearly emphasize basic immunology, vaccinology and herd immunity principles, especially in light of increased acceptance and

use of CAM. More resources, such as INFOVAC-PED, should be more available to provide support for the growing demands placed on health care providers as increasingly more new vaccines are being produced and more questions pertaining to adverse events and long term effects are being asked [Siegrist et al, 2002]. Rigorous surveillance of adverse effects in Switzerland by Swissmedic and at the global level by the Global Advisory Committee on Vaccine Safety should be continually monitored and updates published for more information on the safety of vaccines [Folb et al, 2004]. With a strong background, healthcare providers can confidently respond to the criticisms and scepticism frequently expressed.

4. Vaccination coverage could be improved through simply reminding patients of an upcoming / overdue vaccination shot. An updated Cochrane Database Review recently confirmed that simple procedures such as patient reminders via telephone, postcards or letters could increase immunization rates by 1 to 20 percentage points, with a pooled random effect of OR 1.45 (CI: 1.28, 1.66) for increased likelihood for routine childhood vaccinations, and the effectiveness increasing with several reminders [Jacobson Vann and Szilagyi, 2005]. Reminder and recall were effective for both adults and children, all medical settings and all vaccinations.

6.2 To improve survey methodology

In order to develop a surveillance system that is feasible, comparable and sustainable, a consensus must be found between the cantons and SFOPH to set priorities and goals. Areas that must be discussed include:

1. Grade levels for the schoolchildren. As seen from the data, due to the diversity among the cantons, comparability had been compromised, particularly for HepB, by attempting to use the existing infrastructure. To ensure strong and comparable data, a decision must be taken on the grade levels to be examined. Three options are available: 1) regardless of the grade level of the current routine school examination, all cantons must agree on the grade level and period of data collection. The advantages and disadvantages must be thoroughly discussed. 2) the cantons would have to amend school health policy and synchronize the age at which vaccination cards are examined in order to coordinate the survey with existing infrastructures while maintaining comparability among the cantons. 3) to adapt the method [via municipalities] implemented for the toddlers for data collection. This method would not utilize the existing infrastructure for the schoolchildren, but comparability among the cantons will be increased substantially.

2. Mode of data collection for the schoolchildren should be thoroughly discussed, in terms of feasibility, comparability and sustainability. Should we continue to work with school health services and school doctors and nurses? Or is it better to go through the municipalities, like in NE and BE?

3. Continued collaboration with the school doctors and a standard vaccination summary form require clear guidelines as to what is defined as being up to date.

4. More detailed information are needed regarding the responsibilities of the school doctors: the district for which the school doctor is responsible, name of the schoolhouse, number of classes, number of students. This information is crucial for

accurate sampling design and would reduce the amount of work for ISPMZ incredibly since much energy was expended to ascertain this information ourselves.

5. Cantons where Di or Te vaccination is mandatory could already begin collecting data on vaccination coverage very easily. Because a method must exist to check that all toddlers are vaccinated for either Di or Te, the vaccination card can be easily copied or a vaccination form completed at this time for the district, as in canton GE. This small effort could be easily incorporated into the existing infrastructure, and would subsequently reduce additional work and cost tremendously.

6. Serious consideration should also be given to creating a computer database where vaccination coverage can be directly entered. This can be started for the younger children and would eventually render the need to collect vaccination coverage at school age obsolete, if data are recorded longitudinally. This would entail careful planning as to how to coordinate data entry so that there is a single continually updated registry. This database could overcome many current obstacles, such as nonresponder bias, low participation from foreigners, incomplete information due to record scattering, resulting from numerous vaccination cards and doctors. With this system, many purposes can be met: to determine vaccination coverage very easily and at all levels [local, cantonal and national], to examine demographic factors influencing coverage very quickly, to manage vaccine distribution, to maintain health care cost, to provide insight into patterns of immunization delivery, and especially to monitor the different types of vaccines for short and long term adverse effects [Navarro et al, 2002]. Moreover, Kempe et al [2004] has also shown that a common registry can increase vaccination coverage up to 50% for children aged 24 months of age by reducing record scattering. Finally, a recent study in the USA showed that parental

support of immunization registries, particularly among parents of vaccinated children was relatively high; support was also given from parents whose child has been exempted for at least one vaccination, if registries offered choice for participation (Linkins et al, 2006). It could be expressed to the Office of Data Protection that such a vaccination registration would meet the criteria under the Epidemiology Law (Federal Law 818.101) as a method to prevent disease outbreaks, and naturally, that the data would be treated with the utmost confidentiality.

6.3 To ensure data comparability

Before implementation of the conducted survey as a proposed methodology in a surveillance system, some areas of improvements should be considered, such as

1. Adopting a self-weighting sampling design to obtain accurate estimates and confidence intervals.

2. Reducing respondent burden and maintaining cost, such as decreasing sample size. Because the goal is to utilize this survey as an annual surveillance system, reducing burden should be one of the priorities to ensure compliance and acceptance from all parties involved: parents, teachers, school doctors, municipal halls. There needs to be an acceptable balance between sample size, precision, available resources and cost.

3. Measures to decrease nonresponse below 20%: stronger engagement of the cantons, intensifying telephone attempts, employing telephone assistants to contact foreigners in their native language, locating more telephone numbers, and contacting physicians when vaccination cards are not available from the parents, with permission granted.

4. Fine tuning of the nonresponse adjustments to account for difference in behaviors and attitudes toward vaccination between the Swiss and those of foreign backgrounds.

5. Children must be of the same age to allow comparability, especially those in the school years.

7. Swiss National Vaccination Coverage Survey (SNVCS) 2005-07

With support of the "Schweizerischen Konferenz der kantonalen Gesundheitsdirektorinnen und –direktoren", the second cycle to determine vaccination coverage of children in Switzerland is currently being executed between 2005-07. In this cycle most of the practical recommendations that were listed in sections 6.2 and 6.3 to improve data quality and ease data collection have been implemented, with adaptations mandated by the existing infrastructures and available resources in each canton. The current methodology includes:

1. Data collection for all 26 cantons will be a 3-year rolling cycle. Cantons are encouraged, and not obligated to participate.

2. The same methodology, which was used for toddlers in 1999-2003 should be used for all 3 age groups. Sampling depended on the available sampling frame, which can be summarized into 2 sampling methods:

   - cluster sampling: used in 11 cantons where no central registry of residents exist. The sampling frame is a list of children born in each municipality in each canton. First the municipalities are selected, then the children. To decrease the complexities of the sampling method for the municipalities, the same sampling procedure will be implemented for all 3 age groups.

   - simple random sampling: used in cantons where either a central registry of residents exists, or in cantons with less than 35 municipalities. Since a central registry exists in 7 cantons the central office of registry in these cantons are requested to randomly selected the children for the study. In the remaining 8 cantons, all municipalities are asked to provide a list of all children in the targeted age groups. Once this list is compiled for each canton, then the children are selected via simple random sampling.

3. The target population includes: toddlers 24-35 months, 8-yr olds and 16-yr olds. The exact birth cohort will depend on the time of participation.

4. Funding is provided by both the cantons (2/3) and the SFOPH (1/3). Final financial contribution depends on the amount of work the cantons can assume.

All families of selected children are then invited to participate per mail, which included an introductory letter and a pre-paid return envelope. Families are asked to send a copy or the original vaccination card. Four to five weeks later a reminder is sent to all those who still have not responded, followed by a final telephone attempt, which included 5-6 calls at different hours during the week.

Only vaccination information is evaluated, along with certain demographic factors as supplied by the municipalities or the central registries. Questionnaires are not used. Dates of all administration of selected vaccinations are registered, along with the time of response. Only the names of Hepatitis B vaccines have been recorded due to the numerous HepB vaccinations and schemes available in Switzerland. For those who do not want to participate in the survey, reasons for nonresponse are also noted, and if possible a general vaccination status of the selected child (fully vaccinated, partially vaccinated).

Many of the limitations from the survey 1999-2003, particularly comparability among the 3 age groups and 26 cantons, have been eliminated in the cycle 2005-07 due to methodological improvements as described above. By the end of the 3-year data collection period, 25 cantons will have participated. Only one canton has not joined this national effort. In 2005 data were collected in 10 cantons (AI, AG, BL, BS, NE, SH, SO, SZ, ZH), in 2006 in 8 cantons (FR, JU,

LU, OW, UR, SG, TI, ZG) and in 2007 in 7 cantons (AR, GE, GL, GR, TG, VD, VS). Cantons BE, GE, TI and VD conducted the survey independently of ISPMZ and will share their database at a later time point; while the municipalities and children were sampled by ISPMZ, cantons BL and LU collected the data independently and have already given the data for analysis. The national coverage will be released in 2008.

Collaboration with the cantons has been simple and easy, and most cantons have opted to utilize the same data collection method for all 3 age groups. Due to logistic and financial restrictions, 3 cantons (BS, JU, VD) will continue to collect the data for the school children with the aid of school / LL nurses employed through their highly organized school health services. Despite their organized school health infrastructure, VS has opted to adopt one method for all 3 age groups as recommended for comparative purposes. Data quality and operational cost will be calculated to compare the cost / benefits of the different methodologies utilized.

Annexed is an article providing coverage obtained in the first year of survey cycle 2005-2007 for 9 participating cantons [Lang et al, 2007]. In short, while comparison with data from 1999-2003 revealed that coverage for toddlers has remained relatively unchanged at the national level for Di, Te, and Pol, the rise in coverage for MMR at 1 and 2 doses, Hib and Per at 4 doses at the national level is significant. This could be impacted by the use of combined vaccinations, the change from whole-cell Per to acellular Per [Kuno-Sakai and Kimura, 2004; Bundesamt für Gesundheit, 1996], numerous local measles outbreaks in 2003 [Bundesamt für Gesundheit, 2006], improved vaccination campaign by the SFOPH and increase acceptance of new recommendations due to a general lag time needed to allow for implementation by health care professionals and acceptance by the community.

Of the 9 cantons participating in 2005, there is a general rise in coverage in 8 cantons while in canton SZ there is a clear reduction. There is also a significant rise in coverage for the schoolchildren for all vaccinations; it could however, be a result of the different age recruited for the study. HepB coverage jumped to 65.3% for 1 dose, 60.8% for 2 doses and 36.8% for 3 doses. Similar to Hib and Per, greater acceptance of HepB vaccination since its introduction in 1998, together with heightened knowledge of the disease and improved immunization campaigns in the school could be reasons for the rise in HepB coverage. Furthermore, the change from a 3-dose to a 2-dose scheme for HepB could have also increased acceptance among the adolescents, parents and healthcare professionals.

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9. ANNEXES

Questionnaire (in German, French, Italian and English)

Vaccination summary forms and instructions (old and revised in 2003 for VS)

A. Sampling frames for toddlers

B. Sampling and data collection procedure

C. Cantonal participation and distribution of responsibility
   - C.1 Toddlers
   - C.2 Schoolchildren

D. Participation by the schoolchildren during school years 1999-2003
   - D.1 In collaboration with cantonally employed school / "Lungenliga" nurses in the school health services
   - D.2 In collaboration with school doctors in the school health services
   - D.3 In collaboration with school officials and teachers
   - D.4 In cantons BE, JU, NE and TI

E. Demographic comparison (%) of children participating in the survey, with and without weights, nonresponse adjustments and poststratification
   - E.1 Toddlers
   - E.2 Children at school entry
   - E.3 Children at school departure

F. Vaccination coverage (%) of children at different DTPPolHibMMR series, with and without including pertussis and Hib, by canton
   - F.1 For toddlers at series 33333111, 44443111, 33030111, 44040111
   - F.2 For children at school entry at series 33333111, 44443111, 55553111, 55553222
     - F.2.1 Includes pertussis and Hib
     - F.2.2 Does not include pertussis and Hib
   - F.3 For children at school departure at series 3333111, 4434111, 5535111, 5535222, 635111, 635222 DTPPolMMR
     - F.3.1 Includes pertussis
     - F.3.2 Does not include pertussis
   - F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure (by vaccine, doses and canton)

G. Distribution of the number of children living in Switzerland who remain unvaccinated, by canton

H. Vaccination coverage, with and without imputation for rubella at 1 and 2 doses, by canton
   - H.1 For girls at school departure
   - H.2 For boys at school departure

I. Distribution of health persons who are active in vaccinating as perceived by parents in Switzerland, by canton
   I.1 Toddlers
   I.2 Children at school entry
   I.3 Children at school departure

J. Information status regarding vaccination as perceived by parents of toddlers, by canton
   J.1 Toddlers
   J.2 Children at school entry
   J.3 Children at school departure

K. Sources for information regarding vaccination for parents in Switzerland, by canton
   K.1 Toddlers
   K.2 Children at school entry
   K.3 Children at school departure

L. Percentage of parents of toddlers 24-35 months of age and children at school entry and departure who use alternative medicine, by canton

M. School vaccination policy
   M.1 General school vaccination policy in each canton
   M.2 HepB school vaccination policy in each canton

11. Haben Sie jemals eine **Gelegenheit ausgelassen Ihr Kind gegen** Haemophilus influenza Typ B (Hirnhautentzündung/**Hib**), Masern, Mumps und Röteln **(MMR)** oder Hepatitis B (Gelbsucht/**HepB**) zu impfen? ❒ Ja ❒ Nein ❒ Weiss nicht

Wenn ja, welche Impfung und weshalb? *(Mehrere Antworten möglich.)*

Hib: **H**aemophilus **i**nfluenza Typ **B**/Hirnhautentzündung *(für 2-jährige)*
MMR: **M**asern, **M**umps, und **R**öteln *(für 2-jährige, 1. Klässler, 8. Klässler)*
HepB: **Hep**atitis **B**/Gelbsucht *(für 8. Klässler)*

	Hib	MMR	HepB
a. Mein Arzt/Meine Ärztin hat davon abgeraten.	❒	❒	❒
b. Mein Alternativmediziner hat davon abgeraten.	❒	❒	❒
c. Ich bezweifle die Wirksamkeit der Impfung.	❒	❒	❒
d. Mein Kind hat die entsprechende Krankheit bereits durchgemacht.	❒	❒	❒
e. Ich glaube, dass die Impfung nicht nötig ist.	❒	❒	❒
f. Ich habe nie etwas von dieser Impfung gehört.	❒	❒	❒
g. Es ist besser, wenn mein Kind eine natürliche Immunität erwirbt.	❒	❒	❒
h. Der Impfstoff kann die Gesundheit des Kindes schädigen.	❒	❒	❒
i. Ich mache bei meinen Kindern prinzipiell keine Impfungen.	❒	❒	❒
j. Andere.	❒	❒	❒

12. Haben Sie bei Ihrem Kind **alternativ-medizinische Angebote** beansprucht? ❒ Ja ❒ Nein

a. Wenn ja, welche: *(Mehrere Antworten möglich.)*
- ❒ Homöopathie
- ❒ Therapie mit ärztlichem/alternativ-medizinischem Rat
- ❒ Therapie ohne ärztlichen/alternativ-medizinischen Rat

b. Wenn ja, wann:
- ❒ innerhalb der letzten 2 Jahre
- ❒ vor mehr als 2 Jahren

Bitte vergessen Sie nicht den Impfausweis oder eine Kopie beizulegen. Danke!

221557

Fragebogen

(die Fragen betreffen nur das Kind der Studie)

Benützen Sie bitte einen dunklen Kugelschreiber und tragen Sie die Zahlen rechtsbündig ein.

Angaben zum Kind

Name/Vorname _____ Geschlecht ❒ weiblich ❒ männlich

Geburtsdatum ❒❒❒❒❒❒ Anzahl Geschwister: älter: ❒ jünger: ❒

Anzahl Personen im Haushalt ❒ Postleitzahl ❒❒❒❒

Angaben zu den Eltern

Nationaliät:	Vater	Mutter	
	❒	❒	Schweiz
	❒	❒	Europa, EU-Länder, Norwegen
	❒	❒	Ost-Europa, inkl. Türkei
	❒	❒	Asien
	❒	❒	Andere

Jahrgang: Vater ❒❒❒❒ Mutter ❒❒❒❒

Anzahl Jahre in der Schweiz *(falls Ausländer)*: Vater ❒❒ Mutter ❒❒

Letzte Ausbildung:	Vater	Mutter	
	❒	❒	Keine
	❒	❒	Obligatorische Schule
	❒	❒	Berufsschule (Berufslehre)
	❒	❒	Maturitätsschule, Lehrerseminar
	❒	❒	Höhere Berufsausbildung (z.B höhere Fachschule, Technikerschule)
	❒	❒	Universität/Hochschule
	❒	❒	Andere: _____

Zivilstand:

Mutter: ❒ ledig ❒ verheiratet ❒ getrennt/geschieden ❒ verwitwet ❒ verstorben

Fragen 1–6 sind Aussagen bezüglich Impfung im Allgemeinen. Für jede Frage kreuzen Sie bitte jenes Kästchen an, das Ihrer Meinung am ehesten entspricht: Sehr zutreffend, Zutreffend, Nicht zutreffend, Weiss nicht.

	Sehr zutreffend	*Zutreffend*	*Nicht zutreffend*	*Weiss nicht*
1. Ich folge den Impfempfehlungen unseres Arztes.	❒	❒	❒	❒
2. Es gibt zuviel Druck in der Gesellschaft die Kinder impfen zu lassen.	❒	❒	❒	❒
3. Ich glaube, dass Impfungen vor gewissen Krankheiten schützen.	❒	❒	❒	❒
4. Möglichst viele Kinder sollten geimpft sein, damit alle Kinder vor Komplikationen von gewissen Krankheiten geschützt sind.	❒	❒	❒	❒
5. Ärzte klären die Eltern genügend über Kinder-Impfungen auf.	❒	❒	❒	❒
6. Mich beunruhigen mögliche Nebenwirkungen der Impfstoffe.	❒	❒	❒	❒

Bei den Fragen 7–12 kreuzen Sie bitte alle Kästchen an die Ihrer Meinung entsprechen.

7. Haben Sie **Informationen über Impfungen** erhalten? ❒ Ja ❒ Nein ❒ Weiss nicht

a. Wenn ja, sind diese **Informationen zufriedenstellend** gewesen? ❒ Ja ❒ Nein ❒ Weiss nicht

b. **Von wem** haben Sie Informationen erhalten?
(Mehrere Antworten möglich.)

- ❒ Informationsbroschüren
- ❒ Anfrage beim Arzt/bei der Ärztin
- ❒ Arzt/Ärztin auf dessen/deren Initiative
- ❒ Schularzt/-ärztin/-schwester
- ❒ Mütterberatungsstelle/Hebamme
- ❒ Medien (Zeitung, Fernsehen, Radio, Zeitschriften, Bücher)
- ❒ Krankenkasse
- ❒ Beruf/Ausbildung
- ❒ Andere

c. **Wie** möchten Sie über Impfungen **informiert werden?**
(Mehrere Antworten möglich.)

- ❒ Informationsbroschüren
- ❒ Anfrage beim Arzt/bei der Ärztin
- ❒ Arzt/Ärztin auf dessen/deren Initiative
- ❒ Schularzt/-ärztin/-schwester
- ❒ Mütterberatungsstelle/Hebamme
- ❒ Medien (Zeitung, Fernsehen, Radio, Zeitschriften, Bücher)
- ❒ Krankenkasse
- ❒ Beruf/Ausbildung
- ❒ Andere

8. Von wem wurde **Ihr Kind geimpft?** *(Mehrere Antworten möglich.)*

- ❒ Hausarzt/-ärztin
- ❒ Kinderarzt/-ärztin
- ❒ Alternativmediziner/-in
- ❒ Schularzt/-ärztin
- ❒ Nicht geimpft
- ❒ Andere

9. Wurde Ihr Kind jemals vom **Schularzt für eine Impfung zum Hausarzt überwiesen?** *(nur für 1. Klässler oder 8. Klässler)*

❒ Ja ❒ Nein ❒ Weiss nicht

10. Sind die folgenden **Krankheiten** Ihrer Meinung nach für Ihr Kind, wenn es nicht geimpft ist, **sehr gefährlich, gefährlich oder nicht gefährlich?**
(Bitte je eine Antwort pro Zeile)

	Sehr gefährlich	*Gefährlich*	*Nicht gefährlich*	*Weiss nicht*
Starrkrampf (Tetanus)	❒	❒	❒	❒
Keuchhusten (Pertussis)	❒	❒	❒	❒
Echter Krupp (Diphtherie)	❒	❒	❒	❒
Masern	❒	❒	❒	❒
Mumps	❒	❒	❒	❒
Röteln	❒	❒	❒	❒
Kinderlähmung (Poliomyelitis)	❒	❒	❒	❒
Gelbsucht (Hepatitis B)	❒	❒	❒	❒
Hirnhautentzündung (Hib)	❒	❒	❒	❒
Tuberkulose	❒	❒	❒	❒

11. Avez-vous **laissé passer** une occasion **de faire vacciner** votre enfant contre la méningite **(Hib)** ou la rougeole, les oreillons, la rubéole **(ROR)** ou l'hépatite B **(HépB)** ?

❒ Oui ❒ Non ❒ Ne sais pas

Si oui ... quelle(s) vaccination(s) et pourquoi ? *(Plusieurs réponses possibles.)*

Hib: **H**aemophilus **i**nfluenza type **B**/Méningite *(à 2 ans)*
ROR: **R**ougeole, **O**reillons, et **R**ubéole *(à 2 ans, en 1ère ou en 8ème année scolaire)*
HepB: **Hép**atitis **B** *(en 8ème année scolaire)*

	Hib	ROR	HépB
a. Mon docteur me l'a déconseillé.	❒	❒	❒
b. Mon praticien de médecine parallèle me l'a déconseillé.	❒	❒	❒
c. J'ai des doutes quant à l'efficacité de la vaccination.	❒	❒	❒
d. Mon enfant avait déjà eu cette maladie.	❒	❒	❒
e. Je pense que la vaccination n'est pas nécessaire.	❒	❒	❒
f. Je n'ai jamais entendu parler de ce vaccin.	❒	❒	❒
g. Je crois qu'il est mieux que mon enfant soit immunisé naturellement.	❒	❒	❒
h. Je crois que le vaccin pourrait être nuisible à la santé de mon enfant.	❒	❒	❒
i. Par principe je ne fais pas vacciner mon enfant.	❒	❒	❒
j. Autres.	❒	❒	❒

12. Avez-vous déjà utilisé une **médecine parallèle** pour votre enfant ?

❒ Oui ❒ Non

a. Si oui, lesquelles: *(Plusieurs réponses possibles.)*
- ❒ Homéopathie
- ❒ Thérapie avec un médecin/praticien de médecine parallèle
- ❒ Thérapie sans médecin ni praticien de médecine parallèle

b. Si oui, quand:
- ❒ au cours des deux dernières années
- ❒ il y a plus de deux ans

N'oubliez pas de joindre le carnet de vaccination, ou une copie, s.v.p. Merci !

172501

Questionnaire

(Les questions concernent les enfants de l'enquête)

Veuillez s.v.p. utiliser un stylo à bille foncé et écrire lisiblement.

Données sur l'enfant

Nom/Prénom _____ Sexe ❒ féminin ❒ masculin

Date de naissance ☐☐☐☐☐☐ Nombre frère(s) et sœur(s): ainé(e)s ☐ plus jeune(s) ☐

Nombre de personnes vivant dans le ménage ☐ Code postal ☐☐☐☐

Données sur les parents

Nationalité:	père	mère	
	❒	❒	Suisse
	❒	❒	Europe, Pays EU, Norvège
	❒	❒	Est-Europe, incl. Turquie
	❒	❒	Asie
	❒	❒	Autres

Année de naissance: père ☐☐☐☐ mère ☐☐☐☐

Nombre d'années de séjour en Suisse *(pour les étrangers)*: père ☐☐ mère ☐☐

Dernière formation suivie:	père	mère	
	❒	❒	Pas de formation
	❒	❒	Scolarité obligatoire
	❒	❒	Formation professionnelle
	❒	❒	Ecoles préparant à la maturité, écoles normales
	❒	❒	Formation professionnelle supérieure (p.ex. écoles supérieures et écoles techniques)
	❒	❒	Université/Hautes écoles
	❒	❒	Autres: _____

Etat civil:

mère: ❒ célibataire ❒ mariée ❒ séparée/divorcée ❒ veuve ❒ décédée

Les questions 1 à 6 sont des déclarations concernant des vaccinations. Pour toutes les questions veuillez faire une croix dans les cases qui correspondent le mieux à votre opinion: Absolument vrai, vrai, faux, ne sais pas.

	Absolument vrai	*Vrai*	*Faux*	*Ne sais pas*
1. Je suis les recommandations de mon médecin en ce qui concerne les vaccinations.	❒	❒	❒	❒
2. Il y a trop de pression sociale afin de faire vacciner les enfants.	❒	❒	❒	❒
3. Je crois que les vaccinations protègent de certaines maladies.	❒	❒	❒	❒
4. Un maximum d'enfants devraient être vaccinés, pour que tous soient protégés des complications de certaines maladies.	❒	❒	❒	❒
5. Les médecins informent suffisamment les parents au sujet des vaccinations pour enfants.	❒	❒	❒	❒
6. Les effets indésirables des vaccinations m'inquiètent.	❒	❒	❒	❒

Aux questions 7 à 12 veuillez faire une croix dans les cases qui correspondent le mieux à votre opinion.

7. Avez vous reçu **des informations concernant les vaccinations ?** ❒ Oui ❒ Non ❒ Ne sais pas

a. Si oui, **ces informations** étaient-elles **satisfaisantes ?** ❒ Oui ❒ Non ❒ Ne sais pas

b. Comment avez-vous reçu ces informations ?
(Plusieurs réponses possibles.)

- ❒ Brochures d'information
- ❒ J'ai demandé à mon médecin
- ❒ Le médecin m'en a parlé de sa propre initiative
- ❒ Le médecin, l'infirmière scolaire
- ❒ Service de consultation de nourrissons
- ❒ Médias (journaux, télé, radio, revues, livres)
- ❒ Caisse maladie
- ❒ Métier/Formation
- ❒ Autres

c. Comment désirez-vous être informé ?
(Plusieurs réponses possibles.)

- ❒ Brochures d'information
- ❒ Le médecin, lorsque je lui demande de me renseigner
- ❒ Le médecin agissant de sa propre initiative
- ❒ Le médecin, l'infirmière scolaire
- ❒ Service de consultation de nourrissons
- ❒ Médias (journaux, télé, radio, revues, livres)
- ❒ Caisse maladie
- ❒ Métier/Formation
- ❒ Autres

8. Qui a déjà **vacciné** votre **enfant ?** *(Plusieurs réponses possibles)*

- ❒ Le médecin de famille
- ❒ Le pédiatre
- ❒ Un praticien de médecine parallèle
- ❒ Le médecin scolaire
- ❒ Pas vacciné
- ❒ Autres

9. Le médecin scolaire a-t-il déjà **adressé** votre enfant **à votre médecin de famille** afin de le faire vacciner ? *(seulement pour 1ère ou 8ème année scolaire)*

❒ Oui ❒ Non ❒ Ne sais pas

10. A votre avis, les maladies suivantes sont-elles dangereuses pour l'enfant, s'il n'est pas vacciné ? Choisissez: très dangereuse, dangereuse, pas dangereuse, ne sais pas.
(S.V.P. une seule réponse par ligne.)

	Très dangereuse	*Dangereuse*	*Pas dangereuse*	*Ne sais pas*
Tétanos	❒	❒	❒	❒
Coqueluche	❒	❒	❒	❒
Diphthérie	❒	❒	❒	❒
Rougeole	❒	❒	❒	❒
Oreillons	❒	❒	❒	❒
Rubéole	❒	❒	❒	❒
Poliomyélite	❒	❒	❒	❒
Hépatite B	❒	❒	❒	❒
Méningite (Hib)	❒	❒	❒	❒
Tuberculose	❒	❒	❒	❒

11. Le è già capitato di rifiutare la vaccinazione di suo figlio contro la meningite (da **emofilo B**) o il morbillo, gli orecchioni, la rosolia **(MOR)** o l'epatite B **(EpB)**?

❒ Sì ❒ No ❒ Non so

Se sì, quale(i) vaccinazione(i) e perché? *(Più risposte possibili.)*

Hib: **E**mphilus **i**nfluenza Tipo **B**/Meningite
MOR: **M**orbillo, **O**recchioni, e **R**osolia
EpB: **Ep**atite **B**

	Hib	MOR	EpB
a. Il mio medico me l'ha sconsigliata.	❒	❒	❒
b. Il mio terapista di medicina alternativa l'ha sconsigliata.	❒	❒	❒
c. Ho dei dubbi sull'efficacia della vaccinazione.	❒	❒	❒
d. Mio figlio ha già fatto questa malattia.	❒	❒	❒
e. Penso che la vaccinazione non sia necessaria.	❒	❒	❒
f. Non ho mai sentito parlare di questa vaccinazione.	❒	❒	❒
g. Credo sia meglio che mio figlio si immunizzi in modo naturale.	❒	❒	❒
h. Credo che il vaccino possa nuocere alla salute di mio figlio.	❒	❒	❒
i. Per principio non faccio vaccinare i miei figli.	❒	❒	❒
j. Altro.	❒	❒	❒

12. Avete già ricorso a delle terapie alternative/complementari per i vostri figli?

❒ Sì ❒ No

a. Se sì, quale: *(Più risposte possibili.)*
- ❒ Omeopatia
- ❒ Terapia su consiglio di un medico o di un terapista di medicina alternativa
- ❒ Terapia di propria iniziativa

b. Se sì, quando:
- ❒ nel corso degli ultimi due anni
- ❒ più di due anni fa

Non dimenticare di unire la cartella di vaccinazione. Grazie!

232026

Questionario per i genitori

(I dati forniti saranno utilizzati unicamente a scopo statistico e non saranno trasmessi ad altre persone)
P.f. utilizzare una penna a biro nera/blu e scrivere i numeri il più possibile verso destra.

Dati sul ragazzo/a

Cognome/nome _____ Sesso ❒ femmina ❒ maschio

Data di nascita ☐☐☐☐☐☐ Numero di fratelli e sorelle: più vecchi ☐ più giovani ☐

Numero di persone che vivono in famiglia: ☐ Numero di avviamento postale ☐☐☐☐

Dati sui genitori

Nazionalità:	padre	madre	
	❒	❒	Svizzera
	❒	❒	Europa, Paesi Unione Europea, Norvegia
	❒	❒	Europa dell'Est, inclusa Turchia
	❒	❒	Asia
	❒	❒	Altri

Anno di nascita: padre ☐☐☐☐ madre ☐☐☐☐

Numero di anni di soggiorno in Svizzera *(per stranieri)*: padre ☐☐ madre ☐☐

Ultima formazione conclusa:	padre	madre	
	❒	❒	Nessuna formazione
	❒	❒	Scuole obbligatorie
	❒	❒	Apprendistato o scuole professionali
	❒	❒	Liceo o Scuola superiore di commercio
	❒	❒	Scuola universitaria professionale
	❒	❒	Università/Politecnico
	❒	❒	Altro: _____

Stato civile:

madre: ❒ nubile ❒ coniugata ❒ separata/divorziata ❒ vedova ❒ deceduta

Le domande 1–6 sono affermazioni generali sulle vaccinazioni. Mettere una «X» nella casella che meglio descrive la sua opinione: assolutamente vero, vero, falso, non lo so.

	Assolutamente vero	*Vero*	*Falso*	*Non so*
1. Per le vaccinazioni seguo le raccomandazioni del mio medico.	❒	❒	❒	❒
2. La pressione sociale per vaccinare i bambini è troppo forte.	❒	❒	❒	❒
3. Credo che le vaccinazioni proteggano da determinate malattie.	❒	❒	❒	❒
4. Si dovrebbe vaccinare il maggior numero possibile di bambini, per garantire a tutti la protezione contro le complicazione delle malattie.	❒	❒	❒	❒
5. I medici danno sufficienti informazioni ai genitori sulle vaccinazioni per i bambini.	❒	❒	❒	❒
6. Gli effetti collaterali delle vaccinazioni mi preoccupano.	❒	❒	❒	❒

Per le domande da 7 a 12 mettere una «X» nelle caselle che corrispondono meglio alla vostra opinione.

7. Avete ricevuto **delle informazioni a riguardo delle vaccinazioni?** ❒ Sì ❒ No ❒ Non lo so

a. Se sì, **le informazioni** sono state **soddisfacenti?** ❒ Sì ❒ No ❒ Non lo so

b. **Da chi o da che cosa** avete ricevuto le informazioni?
(Più risposte possibili.)

- ❒ Da opuscoli informativi
- ❒ Ho chiesto al mio medico
- ❒ Il medico me ne ha parlato spontaneamente
- ❒ Il medico scolastico me ne ha parlato
- ❒ Dal Consorzio profilattico materno e pediatrico
- ❒ Dai media (giornali, TV, radio, riviste, libri)
- ❒ Dalla Cassa malati
- ❒ Dal mondo lavorativo/scolastico
- ❒ Altro

c. **In che modo desiderate essere informati?**
(Più risposte possibili.)

- ❒ Opuscoli informativi
- ❒ Richiesta al medico di famiglia
- ❒ Il medico dovrebbe parlarne attivamente
- ❒ Dal medico scolastico
- ❒ Dal Consorzio profilattico materno e pediatrico
- ❒ Dai media (giornali, TV, radio, riviste, libri)
- ❒ Dalla Cassa malati
- ❒ Dal mondo lavorativo/scolastico
- ❒ Altro

8. **Chi ha vaccinato suo figlio?** *(Più risposte possibili.)*

- ❒ Il medico di famiglia
- ❒ Il pediatra
- ❒ Un terapista di medicina alternativa/complementare
- ❒ Il medico scolastico
- ❒ Non è vaccinato
- ❒ Altro

9. **Il medico scolastico** ha già **inviato** suo figlio **dal medico di famiglia** per una vaccinazione? *(solo per gli allievi delle scuole elementari e medie)*

❒ Sì ❒ No ❒ Non so

10. Secondo lei, le malattie seguenti sono pericolose per suo figlio, **se non è vaccinato?** Scelga tra: molto pericolosa, pericolosa, non pericolosa, non so.
(Per favore una sola risposta per linea.)

	Molto pericolosa	*Pericolosa*	*Non pericolosa*	*Non so*
Tetano	❒	❒	❒	❒
Pertosse	❒	❒	❒	❒
Difterite	❒	❒	❒	❒
Morbillo	❒	❒	❒	❒
Orecchioni	❒	❒	❒	❒
Rosolia	❒	❒	❒	❒
Poliomielite	❒	❒	❒	❒
Epatite B	❒	❒	❒	❒
Meningite (da emofilo B)	❒	❒	❒	❒
Tubercolosi	❒	❒	❒	❒

11. Have you ever missed an opportunity to vaccinate your child for Hemophilus influenza Type B (Meningitis/**Hib**), Measles, Mumps and Rubella (**MMR**) or Hepatitis B (**HepB**)?

❒ Yes ❒ No ❒ Do not know

If yes, for which one(s)? *(More than one answer is possible.)*

Hib: **H**emophilus **i**nfluenza Type **B**/Meningitis *(applies only to 2 years old)*
MMR: **M**easles, **M**umps, and **R**ubella *(applies to 2 years old, 1st graders, 8th graders)*
HepB: **Hep**atitis **B** *(applies only to 8th graders)*

	Hib	MMR	HepB
a. My doctor advised against it.	❒	❒	❒
b. My alternative medicine practitioner advised against it.	❒	❒	❒
c. I doubt the effectiveness of vaccination.	❒	❒	❒
d. My child has already undergone the corresponding illness.	❒	❒	❒
e. I believe that the vaccination is not necessary.	❒	❒	❒
f. I have never heard of this vaccination.	❒	❒	❒
g. It is better when my child develops a natural immunity.	❒	❒	❒
h. The vaccine can negatively affect my child's health.	❒	❒	❒
i. In principle I do not vaccinate.	❒	❒	❒
j. Others.	❒	❒	❒

12. Have you ever used any form of alternative medicine on your child?

❒ Yes ❒ No

a. If yes, which one(s): *(More than one answer is possible.)*
- ❒ Homeopathy
- ❒ Therapy after consulting a doctor/ alternative medicine practitioner
- ❒ Therapy without consulting a doctor/ alternative medicine practitioner

b. If yes, when:
- ❒ within the last 2 years
- ❒ for more than 2 years

Please do not forget to include the vaccination booklet. Thank you!

023072

Questionnaire

(the questions apply only to the child selected for the study)

Please use a ball point pen and write legibly.

Regarding the child

Last/First Name _____ Gender ❒ female ❒ male

Date of birth ☐☐☐☐☐☐ Number of siblings: older ☐ younger ☐

Number of persons living in household ☐ Zip code ☐☐☐☐

Regarding the parents

Nationality:	Father	Mother	
	❒	❒	Switzerland
	❒	❒	Europe, EU-countries, Norway
	❒	❒	East Europe, incl. Turkey
	❒	❒	Asia
	❒	❒	Others

Year of birth: Father ☐☐☐☐ Mother ☐☐☐☐

No. of years in Switzerland *(if a foreigner)*: Father ☐☐ Mother ☐☐

Highest level of Education:	Father	Mother	
	❒	❒	None
	❒	❒	First 9 years of schooling
	❒	❒	Basic vocational training (Apprenticeship)
	❒	❒	High school diploma, Teaching training
	❒	❒	Higher non-university diploma (ex. technical college, vocational proficiency diploma)
	❒	❒	University
	❒	❒	Others: _____

Marital status:

Mother: ❒ single ❒ married ❒ separated/divorced ❒ widowed ❒ deceased

Questions 1–6 are statements regarding vaccination in general. For each question please tick the box that corresponds closest to your opinion: Strongly agree, Agree, Disagree, Do not Know.

	Strongly agree	*Agree*	*Disagree*	*Do not know*
1. I follow the doctor's recommendations regarding vaccination.	❒	❒	❒	❒
2. There is too much social pressure to vaccinate children.	❒	❒	❒	❒
3. I believe that vaccination protects from certain diseases.	❒	❒	❒	❒
4. As many children as possible should be vaccinated so that all children will be protected from complications associated with certain diseases.	❒	❒	❒	❒
5. Doctors provide enough information on childhood immunization.	❒	❒	❒	❒
6. I am concerned about possible side-effects from vaccines.	❒	❒	❒	❒

For questions 7–12, please tick all boxes that apply.

7. Have you received **information regarding vaccination?** ❒ Yes ❒ No ❒ Do not know

a. If yes, are you **happy** with this **information?** ❒ Yes ❒ No ❒ Do not know

b. **From whom** have you received this imformation?
(More than one answer is possible.)

- ❒ Information brochures
- ❒ From the doctor upon my request
- ❒ From the doctor's own initiative
- ❒ School doctor/nurse
- ❒ Public health services/Midwife
- ❒ Media (Newspapers, TV, Radio, Magazines, Books)
- ❒ Health insurance
- ❒ Job/Education
- ❒ Others

c. **How** would you like **to be informed** about vaccination?
(More than one answer is possible.)

- ❒ Information brochures
- ❒ From the doctor upon my request
- ❒ From the doctor's own initiative
- ❒ School doctor/nurse
- ❒ Public health services/Midwife
- ❒ Media (Newspapers, TV, Radio, Magazines, Books)
- ❒ Health insurance
- ❒ Job/Education
- ❒ Others

8. **By whom** was your **child vaccinated?** *(More than one answer is possible.)*

- ❒ Family doctor
- ❒ Pediatrician
- ❒ Alternative medicine practitioner
- ❒ School doctor
- ❒ Not vaccinated
- ❒ Others

9. Was your child ever **referred to the family doctor by the school doctor** for a vaccination? *(applies only to 1st or 8th graders)*

❒ Yes ❒ No ❒ Do not know

10. In your opinion, would the following **illnesses** be **very dangerous, dangerous,** or **not dangerous** for your child, if he/she has not been vaccinated?
(Please tick only one box for each row.)

	Very dangerous	*Dangerous*	*Not dangerous*	*Do not know*
Tetanus	❒	❒	❒	❒
Pertussis (Whooping Cough)	❒	❒	❒	❒
Diphtheria	❒	❒	❒	❒
Measles	❒	❒	❒	❒
Mumps	❒	❒	❒	❒
Rubella (German measles)	❒	❒	❒	❒
Polio	❒	❒	❒	❒
Hepatitis B	❒	❒	❒	❒
Meningitis (Hib)	❒	❒	❒	❒
Tuberculosis	❒	❒	❒	❒

Instruktionen zum Ausfüllen des Impf-Statistikblattes

Impfinformationen

Bitte pro Klasse ein Blatt ausfüllen; alle Schüler sollten darauf vermerkt sein, auch wenn der Impfausweis nicht kontrolliert wurde.

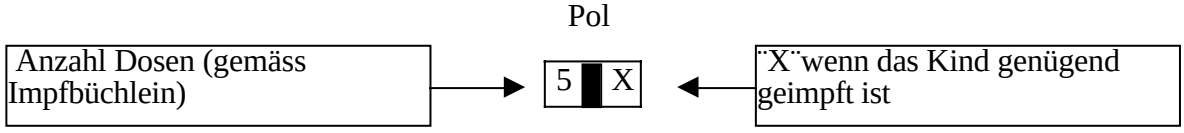
1. **Nationalität**: Bitte verwenden Sie den Code unten auf dem Impfblatt:
   0: Schweiz
   1: Europa, EU-Länder, Norwegen, USA, Kanada
   2: Ost-Europa, inkl. Türkei und Ex-Yugoslawien
   3: Asien, Afrika
   4: Andere

2. **Status des Impfausweises (IA):** Bitte den entsprechenden Code einfügen:
   1: kontrolliert: IA geprüft
   2: neuer IA: keine alten Impfdaten vorhanden
   3: IA fehlt: nicht vorhanden, siehe unten

3. **Fehlender Impfausweis (IA):** Bitte den entsprechenden Code einfügen:
   1: Impfung abgelehnt
   2: schon geimpft (z. B. beim Haus-Kinderarzt, im Spital, usw.)
   3: Kind krank
   4: IA verloren
   5: gar nicht geimpft (bei Anzahl Dosen ”0” eintragen)
   6: andere Gründe, bitte vermerken

4. **Impfungen: Anzahl bisherige Dosen / genügend geimpft**
   Bitte tragen Sie die Anzahl Dosen ins linke Kästchen ein. Falls das Kind genügend geimpft ist, das rechte Kästchen ankreuzen. Siehe Ausnahmen auf dem Impfstatistikblatt und Erläuterungen auf dem Impfplan nach Richtlinien des BAG und der Schweizerische Kommission für Impffragen. Bitte Angaben über Hepatitis B auch bei Zweitklässlern erfassen.

   Zum Beispiel: Ein Zweitklässler erhielt bisher gemäss Impfbüchlein 4 Dosen für Di/Te/Per, 5 für Polio, 1 für Hib (nach 15 Monaten) und 1 für MMR. Dann sollten bei Di/Te/Per die Zahl “**4**“, bei Polio “**5**“, bei Hib “**1**“ und bei MMR “**1**“ ins linke Kästchen eingetragen werden. Rechts wird nur Hib und Polio angekreuzt “**X**“.



Ich hoffe, dass diese Erklärungen verständlich sind und Ihnen das Ausfüllen des Impfblattes erleichtern. Bitte kontaktieren Sie ISPMZ, falls Sie Fragen haben. Besten Dank für Ihre Mitarbeit.

Phung Lang oder Ursula Piller email: plang@ifspm.unizh.ch Tel: 01 634 46 72/13
Institut für Sozial- und Präventivmedizin der Universität Zürich, Sumatrastr. 30, 8006 Zürich

Durchimpfungsstudie - Schulen VS 2003

Impf-Statistikblatt (Wir bitten Sie, für jede Klasse ein eigenes Formular zu verwenden.)

Periode: ❑ Nov. – Dez. 02 ❑ Jan. – März 03 ❑ Apr. - Juni 03

Krankenschwester _____

Schulhaus _____ Postleitzahl _____

Klasse: ❑ 2. P ❑ 2. OS

Durchschnittsalter der Schüler ☐☐ Total Schülerzahl in der Klasse ☐☐

Anzahl kontrollierter Impfausweise (IA) ☐☐

Status IA: 1. kontrolliert; 2. neuer IA; 3. IA fehlt

Fehlende (fehl.) IA: 1. Impfung abgelehnt 2. schon geimpft 3. Kind krank 4. IA verloren 5. gar nicht geimpft 6. Andere Gründe: bitte angeben.

Impfungen: Bitte Anzahl Dosen in das linke Kästchen eintragen und ein "X" in das rechte Kästchen schreiben, falls das Kind genügend geimpft ist. Siehe Impfplan unten.

	Di°	Te°	Per/Pa	Pol	Hib°	Mas	Mum	Röt	HepB°
2.P	5	5	5	5	4	2	2	2	Twinrix: 2 oder 3
2.OS	6	6	5	5	-	2	2	2	Gen-H-B-Vax : 2 Engerix : 3

°Ausnahmen:
Di Te : 2.OS : 6 Dosen falls vor dem 1.Geburtstag geimpft; 5 Dosen nach dem 1. Geburtstag ; 2.P : 5 Dosen, falls vor dem 1. Geburtstag geimpft oder 4 Dosen nach dem 1. Geburtstag (3 Dosen +1 Rappel)
Hib: 1 Dosis, falls nach 15 Monaten geimpft wurde
HepB: bei allen Kindern : 3 Dosen (oder 2 Dosen mitTwinrix für Erwachsene) ; Jugendl. (11-18 Jährige) : 2 Dosen mit GenHb für Erwachsene od. 3 Dosen mit Engerix

	Nation-alität *	männl. weibl.	Status IA	bei fehl. IA	Andere Gründe, bitte angeben:	IMPFUNGEN: ANZAHL BISHERIGE DOSEN / GENÜGEND GEIMPFT Di	Te	Per / Pa	Pol	Hib	Mas	Mum	Rot	HepB
1.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
2.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
3.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
4.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
5.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
6.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
7.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
8.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
9.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

* Nationalität: 0: Schweiz; 1: Europa, EU-Länder, Norwegen, USA, Kanada; 2: Ost-Europa, inkl. Türkei, Ex-Yugoslawien; 3: Asien, Afrika; 4: Andere.

* Nationalität: 0: Schweiz; 1: Europa, EU-Länder, Norwegen, USA, Kanada; 2: Ost-Europa, inkl. Türkei, Ex-Yugoslawien; 3: Asien, Afrika; 4: Andere.

	Nationalität *	männl. weibl.	Status IA	bei fehl. IA	Andere Gründe, bitte angeben:	IMPFUNGEN: ANZAHL BISHERIGE DOSEN / GENüGEND GEIMPFT Di	Te	Per / Pa	Pol	Hib	Mas	Mum	Rot	HepB
10.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
11.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
12.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
13.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
14.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
15.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
16.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
17.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
18.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
19.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
20.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
21.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
22.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
23.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
24.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
25.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
26.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

Ort/Datum _____Unterschrift und Stempel der Krankenschwester _____

Instructions pour remplir la feuille de statistique pour les vaccinations

Informations sur les vaccinations

S.v.p. utiliser pour chaque classe une feuille. Marquer tous les enfants, même si le carnet de vaccinations n'est pas contrôlé.

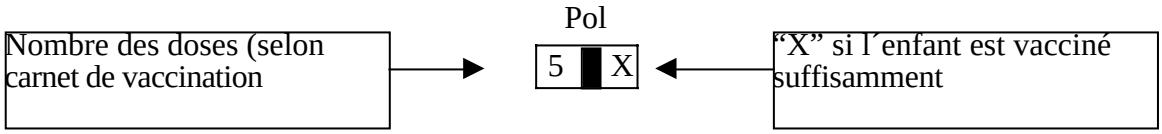
1. **Nationalité**: Noter le code correspondant, s.v.p:
   0: Suisse
   1: Europe, pays EU, Norvège, USA, Canada
   2: Europe de l´Est, incl. Turquie et Ex-Yougoslavie
   3: Asie, Afrique
   4: Autres

2. **Statut du carnet de vaccinations (CV):** Noter le code correspondant, s.v.p:
   1: contrôlé: CV examiné
   2: nouveau CV: pas d'anciennes données de vaccination
   3: CV manque: pas de CV, voir en bas

3. **Carnet de vaccinations (CV) manque:** Noter le code qui correspond, s.v.p:
   1 : refusé la vaccination
   2 : déjà vacciné (p.ex: hôpital, médecin de famille, etc.)
   3 : enfant malade
   4 : CV perdu
   5 : pas vacciné (inscrire le chiffre "0" sous nombre des doses)
   6 : autres raisons: marquer s.v.p.

4. **Vaccinations : Nombre de doses reçues / suffisamment vacciné**
   Mettre la quantité exacte dans la case de gauche. Au cas où l'enfant est suffisamment vacciné mettre une croix dans la case de droite. Voir exceptions sur la feuille de statistique pour les vaccinations et les explications sur la liste de OFSP et de la Commission suisse pour les vaccinations selon leur directive. Mettre aussi les doses de l' Hépatite B pour les enfants de 2ème, s.v.p.

   Exemple: pour une élève de 2ème années qui a reçu selon CV 4 doses de DTP, 5 de Polio 1 Hib (après 15 mois) et 1 ROR, il faut inscrire le chiffre "**4**" dans la case de gauche Di/ Te/ Per, "**5**" pour Polio, "**1**" pour Hib et le chiffre "**1**" pour Rougole, Oreillons et Rubéole. Mettre seulement une croix "**X**" pour Hib et Polio dans la case de droite.



Nous espérons que ces explications sont claires et vous permettent de remplir la feuille de statistique pour les vaccinations. En cas de questions, nous vous prions de contacter l'ISPMZ. Nous vous remercions cordialement de votre collaboration.

Phung Lang oder Ursula Piller email: plang@ifspm.unizh.ch Tel: 01 634 46 72/13
Institut für Sozial- und Präventivmedizin der Universität Zürich, Sumatrastr. 30, 8006 Zürich

Etude sur la couverture vaccinale - écoles VS 2003

Feuille de relevé de vaccinations (Merci de prendre pour chaque classe une nouvelle feuille)

Période: ❑ nov. – déc. 02 ❑ jan. - mars 03 ❑ avr. - juin 03

Infirmière scolaire _____

Ecole _____ Code postal _____

Classe: ❑ 2P ❑ 2 ^{P}CO

Age moyen en classe ☐☐ Nombre d'élèves en classe ☐☐

Nombre de carnets de vaccinations (CV) contrôlés ☐☐

Statut CV: 1. contrôlé 2. nouveau CV 3. CV manque

CV manque: 1. refusé la vaccination 2. déjà vacciné 3. enfant malade
4. CV perdu 5. pas vacciné 6. autres raisons, marquer s.v.p.

Vaccinations: Mettre la quantité exacte dans la case de gauche et un "X" dans la case de droite, si l'élève est vacciné suffisamment, s.v.p. Voir le plan de vaccinations en-bas.

	Di°	Te°	aPer	Pol	Hib°	Roug	Oreill	Rub	HépB°
2^{P}	5	5	5	5	4	2	2	2	Twinrix: 2 ou 3
2 ^{P}CO	6	6	5	5	-	2	2	2	Gen-H-B-Vax : 2 Engerix : 3

°Exceptions:
Di Te : 2 ^{P}CO: 6 doses si la vaccination a débuté avant 1 an ou 5 doses après 1 an ;
2^{P}: 5 doses si la vaccination a débuté avant 1 an ou 4 doses après 1 an (3 dos. +1 rappel)
Hib: 1 dose après 15 mois
HépB: à tout âge : 3 doses (ou 2 doses de Twinrix adulte) ;
adolescent (11-18 ans) : 2 doses de GenHbvax adulte ou 3 doses de Engerix

	Natio-nalité *	Sexe	Statut CV	si le CV manque	autres raisons marquer, s.v.p.:	**VACCINATIONS: NOMBRE DE DOSES REÇUES / SUFFISAMMENT VACCINE** Di	Te	Per/ aPer	Pol	Hib	Roug	Oreill	Rub	HépB
1.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
2.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
3.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
4.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
5.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
6.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
7.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
8.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
9.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

* Nationalité: 0: Suisse; 1: Europe, pays EU, Norvège, USA, Canada; 2: Europe de l´Est, y c. Turquie, ex-Yougoslavie; 3: Asie, Afrique; 4: Autres.

* Nationalité: 0: Suisse; 1: Europe, pays EU, Norvège, USA, Canada; 2: Europe de l´Est, y c. Turquie, ex-Yougoslavie; 3: Asie, Afrique; 4: Autres.

	Natio-nalité *	Sexe	Statut CV	si le CV manque	autres raisons marquer s.v.p.:	VACCINATIONS: NOMBRE DE DOSES REÇUES / SUFFISAMMENT VACCINE Di	Te	Per/ aPer	Pol	Hib	Roug	Oreill	Rub	HépB
10.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
11.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
12.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
13.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
14.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
15.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
16.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
17.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
18.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
19.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
20.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
21.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
22.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
23.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
24.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
25.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐
26.	☐	☐	☐	☐	_____	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐	☐☐

Lieu/Date _____Timbre et signature de l' infimière _____

Annex A. SAMPLING FRAMES FOR TODDLERS

Canton	AVAILABLE SAMPLING FRAME
AG	Standard list
AI	Single central registry
AR	Standard list
BE	Standard list
BL	Standard list
BS	Single central registry
FR	Standard list
GE	A monthly list of all children at 28 months
GL	Standard list
GR	Standard list
JU	Standard list
LU	Standard list
NE	Single central registry
NW	Standard list
OW	Standard list
SG	Standard list
SH	Standard list
SO	Standard list
SZ	Standard list
TG	Standard list
TI	Standard list
UR	Standard list
VD	Single central registry
VS	Standard list
ZG	Standard list
ZH	Standard list

Standard list: a list of the number of children born in a certain year in each town. This list can be obtained from the statistical office in every canton. A self-weighing sampling design has been developed for cantons with this standard list. It has been used in 6 cantons in 2002 and and it is recommended to be used in the future.
For cantons with a a single central registry, random sampling was used.
For small Cantons (AI, NW, GL, UR, OW), all children were recruited.
GE: all children who have reached 28 months of age are required to submit the vaccination cards to the office of the cantonal physician. Letters are sent out monthly,which includes about 500 children.

Annex B. Sampling and Data Collection Procedure

I. TODDLERS (24-35 months of age)

1. Obtain approval from the office of data protection.
2. Obtain a list of children born in a specific year per municipality.
3. Select municipalities.
4. Select children in the municipalities.
5. Send letters to the municipalities requesting information on these children.
6. Send letters to the parents of the selected children.
7. One month later, send a reminder.
8. After another month, telephone.
9. Return the vaccination card to the parents after information has been extracted.

II. SCHOOLCHILDREN (School entry and departure)

1. Obtain a list of all public schools and the number of classes in the one grade, and if possible, the number of children in each class.

2. Randomly select the classes.

3. Request schooldoctors and teachers (or school nurses or school officials) of these selected classes for their cooperation and supply them with the questionnaires.

4. Request the teachers to send the vaccination cards and completed questionnaires directly to ISPMZ, or to the schooldoctors who should send the information back to ISPMZ.

5. Return the vaccination cards directly to the teachers or doctors once copies have been made, unless otherwise specified.

Annex C: Cantonal Participation and Distribution of Responsibility

C.1. Toddlers

KT	Participation	Sampling List	Selection of Samples	Mailing	Telephone Reminders	Data Entry	Evaluation
AG	2000	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
AI	2000	None	None	ISPMZ	ISPMZ	ISPMZ	ISPMZ
AR	2002	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
BE	2001	Canton	Canton	Canton	none	Canton	Canton
BL	2000	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
BS	2000	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
FR	2001	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
GE	2002	Canton	Canton	Canton	none	Canton /ISPMZ	Canton /ISPMZ
GL	2001	None	None	ISPMZ	ISPMZ	ISPMZ	ISPMZ
GR	2002	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
JU	2002	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
LU	2001	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
NE	2000	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
NW	2001	None	None	ISPMZ	ISPMZ	ISPMZ	ISPMZ
OW	2002	None	None	ISPMZ	ISPMZ	ISPMZ	ISPMZ
SG	2002	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
SH	2001	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
SO	2000	ISPMZ	ISPMZ	Canton	none	ISPMZ	ISPMZ
SZ	2001	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
TG	2000	ISPMZ	ISPMZ	Canton	none	ISPMZ	ISPMZ
TI	2002	Canton	Canton	Canton	Canton	Canton	ISPMZ
UR	2001	None	None	ISPMZ	ISPMZ	ISPMZ	ISPMZ
VD	2003	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
VS	1999	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
ZG	2002	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ
ZH	1999	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ	ISPMZ

BE, TI: conducted survey independent of ISPMZ.

GE: Birth cohort of children 28 months of age were selected TI: children in Kindergarten were sampled. All other cantons: 24-35 months of age.

C.2. Schoolchildren

KT	School year Participation	Sampling List	Selection of Samples	Data Collection	vax card or vax.sum.form	Data Entry	Evaluation
AG	2000-02	Canton	ISPMZ	Canton	vax card	ISPMZ	ISPMZ
AI	2000-01	None	None	Canton	vax.sum.form	ISPMZ	ISPMZ
AR	2001-02	ISPMZ	ISPMZ	Canton	vax.sum.form	ISPMZ	ISPMZ
BE	2001-02	Canton	Canton	Canton	Canton	Canton	Canton
BL	2000-01	ISPMZ	ISPMZ	Canton	vax.sum.form	ISPMZ	ISPMZ
BS	2001-02	Canton	ISPMZ	Canton	Canton	Canton	ISPMZ
FR	2000-01	ISPMZ	ISPMZ	Canton/ISPMZ	vax card	ISPMZ	ISPMZ
GE	2001-02	Canton	ISPMZ	Canton	vax.sum.form	ISPMZ	ISPMZ
GL	2000-01	None	None	Canton/ISPMZ	vax.sum.form	ISPMZ	ISPMZ
GR	2001-02	Canton	ISPMZ	Canton/ISPMZ	vax.sum.form	ISPMZ	ISPMZ
JU	2001-02	Canton	ISPMZ	Canton	Canton	ISPMZ	ISPMZ
LU	2000-01	ISPMZ	ISPMZ	ISPMZ	vax card	ISPMZ	ISPMZ
NE	2000-01	ISPMZ	ISPMZ	ISPMZ	vax card	ISPMZ	ISPMZ
NW	2001-02	None	None	ISPMZ	vax card	ISPMZ	ISPMZ
OW	2001-02	None	None	ISPMZ	vax card	ISPMZ	ISPMZ
SG	2001-02	Canton	ISPMZ	Canton/ISPMZ	vax card	ISPMZ	ISPMZ
SH	2000-01	Canton	ISPMZ	Canton/ISPMZ	vax.sum.form	ISPMZ	ISPMZ
SO	2000-01	ISPMZ	ISPMZ	Canton	vax card	ISPMZ	ISPMZ
SZ	2000-01	Canton	ISPMZ	Canton	vax.sum.form	ISPMZ	ISPMZ
TG	2000-01	ISPMZ	ISPMZ	Canton	vax card	ISPMZ	ISPMZ
TI	2002-03	Canton	Canton	Canton	Canton	Canton	ISPMZ
UR	2001-02	None	None	Canton/ISPMZ	vax.sum.form	ISPMZ	ISPMZ
VD	2001-03	Canton	Canton	Canton	vax.sum.form	ISPMZ	Canton/ISPMZ
VS	1998-99	ISPMZ	ISPMZ	ISPMZ	vax card	ISPMZ	ISPMZ
ZG	2001-02	ISPMZ	ISPMZ	ISPMZ	vax card	ISPMZ	ISPMZ
ZH	1998-99	ISPMZ	ISPMZ	ISPMZ	vax card	ISPMZ	ISPMZ

vax: vaccination; vax.sum.form: vaccination summary form. In some cantons, many school doctors used the vax.sum.form, however, we still needed to collect a few vax cards for the study to be completed.

BE, TI, VD: no questionnaires were used. JU: vax. coverage not possible to be determined.

Annex D.1. Participation by the schoolchildren during school years 1999-2003, in collaboration with cantonally employed school / "Lungenliga" nurses in the school health services

School entry	AG		BL		BS		GE		SZ		VD		VS		Total	
	1.Kl		1.Kl		3.Kl		1.Kl		1.Kl		1.Kl		1.Kl		School entry	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	38		40		39		45		40		36		45		283	
Number of students	600		562		617		582		714		538		560		4173	
Number of participating classes	32	84.2	40	100.0	38	97.4	45	100.0	35	87.5	36	100.0	42	93.3	268	94.7
Number of vaccination cards	470	78.3	412	73.3	566	91.7	510	87.6	518	72.5	518	96.3	309	55.2	3303	79.2
Number of questionnaires	464	77.3	429	76.3	444	72.0	457	78.5	376	52.7	0	0.0	377	67.3	2547	61.0
Total response (VC or Q):	503	83.8	434	77.2	591	95.8	535	91.9	564	79.0	518	96.3	395	70.5	3540	84.8
Total nonresponse:	97	16.2	128	22.8	26	4.2	47	8.1	150	21.0	20	3.7	165	29.5	633	15.2

School departure	8.Kl		9.Kl		9.Kl		8.Kl		8.Kl		8.Kl		8.Kl		School departure	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	32		35		43		31		27		44		31		243	
Number of students	580		604		746		593		675		849		429		4476	
Number of participating classes	31	96.9	35	100.0	43	100.0	31	100.0	24	88.9	41	93.2	29	93.5	234	96.3
Number of vaccination cards	532	91.7	347	57.5	499	66.9	534	90.1	441	65.3	765	90.1	371	86.5	3489	77.9
Number of questionnaires	514	88.6	364	60.3	474	63.5	446	75.2	255	37.8	0	0.0	372	86.7	2425	54.2
Total response (VC or Q):	555	95.7	370	61.3	660	88.5	548	92.4	459	68.0	765	90.1	422	98.4	3779	84.4
Total nonresponse:	25	4.3	234	38.7	86	11.5	45	7.6	216	32.0	84	9.9	7	1.6	697	15.6

VC: vaccination card Q: questionnaire

VD: questionnaire was not used.

Annex D.2. Participation by the schoolchildren during school years 1999-2003, in collaboration with school doctors in the school health services

School entry	AI		AR		GL		GR		SG		SH		UR		ZH		Total	
	1.Kl		Kg.		Kg./ 1.Kl		1.Kl		1.Kl		Kg.		1.Kl		1.Kl		School entry	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	17		34		29		40		36		33		32		39		260	
Number of students	253		523		470		644		603		602		508		677		4280	
Number of participating classes	15	88.2	30	100.0	24	82.8	23	57.5	28	77.8	27	81.8	19	59.4	38	97.4	204	78.5
Number of vaccination cards	204	80.6	308	58.9	254	54.0	258	40.1	260	43.1	340	56.5	261	51.4	538	79.5	2423	56.6
Number of questionnaires	171	67.6	234	44.7	263	56.0	248	38.5	267	44.3	374	62.1	225	44.3	584	86.3	2366	55.3
Total response (VC or Q):	209	82.6	324	62.0	276	58.7	273	42.4	279	46.3	379	63.0	275	54.1	592	87.4	2607	60.9
Total nonresponse:	44	17.4	199	38.0	194	41.3	371	57.6	324	53.7	223	37.0	233	45.9	85	12.6	1673	39.1

School departure	6.Kl		8.Kl		8./ 9.Kl		9.Kl		8.Kl		8.Kl		8.Kl		8.Kl		School departure	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	14		35		25		35		34		40		32		37		252	
Number of students	192		488		381		604		599		768		464		560		4056	
Number of participating classes	10	71.4	23	65.7	19	76.0	26	74.3	24	70.6	34	85.0	20	62.5	33	89.2	189	75.0
Number of vaccination cards	128	66.7	317	65.0	264	69.3	340	56.3	306	51.1	457	59.5	302	65.1	444	79.3	2558	63.1
Number of questionnaires	111	57.8	132	27.0	147	38.6	304	50.3	342	57.1	297	38.7	267	57.5	484	86.4	2084	51.4
Total response (VC or Q):	137	71.4	322	66.0	275	72.2	351	58.1	350	58.4	480	62.5	310	66.8	499	89.1	2724	67.2
Total nonresponse:	55	28.6	166	34.0	106	27.8	253	41.9	249	41.6	288	37.5	154	33.2	61	10.9	1332	32.8

VC: vaccination card Q: questionnaire

Annex D.3. Participation by schoolchildren during school years 1999-2003, in collaboration with school officials and teachers

School entry	FR		LU		NW		OW		SO		TG		ZG		Total	
	1.Kl		1.Kl		2.Kl		1.Kl		1.Kl		Kg.		2.Kl		School entry	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	34		40		30		27		45		40		49		265	
Number of students	467		800		473		445		712		678		1150		4725	
Number of participating classes	23	67.6	33	82.5	12	40.0	7	25.9	40	88.9	29	72.5	9	18.4	153	57.7
Number of vaccination cards	313	67.0	399	49.9	130	27.5	82	18.4	374	52.5	334	49.3	122	10.6	1754	37.1
Number of questionnaires	349	74.7	426	53.3	138	29.2	88	19.8	411	57.7	359	52.9	134	11.7	1905	40.3
Total response (VC or Q):	354	75.8	427	53.4	138	29.2	90	20.2	411	57.7	359	52.9	136	11.8	1915	40.5
Total nonresponse:	113	24.2	373	46.6	335	70.8	355	79.8	301	42.3	319	47.1	1014	88.2	2810	59.5

School departure	8.Kl		9.Kl		9.Kl		8.Kl		8.Kl		8.Kl		9.Kl		School departure	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Number of classes	30		25		27		27		34		54		51		248	
Number of students	632		500		459		491		725		1025		882		4714	
Number of participating classes	23	76.7	18	72.0	8	29.6	5	18.5	27	79.4	22	40.7	8	15.7	111	44.8
Number of vaccination cards	372	58.9	254	50.8	89	19.4	61	12.4	376	51.9	365	35.6	59	6.7	1576	33.4
Number of questionnaires	390	61.7	270	54.0	93	20.3	63	12.8	414	57.1	388	37.9	76	8.6	1694	35.9
Total response (VC or Q):	394	62.3	273	54.6	94	20.5	64	13.0	415	57.2	389	38.0	76	8.6	1705	36.2
Total nonresponse:	238	37.7	227	45.4	365	79.5	427	87.0	310	42.8	636	62.0	806	91.4	3009	63.8

VC: vaccination card Q: questionnaire

NE: same sampling procedure was used as with toddlers: simple random sampling of schoolchildren, who were directly contacted.

Total: does not include NE

Annex D.4. Participation by schoolchildren during school years 1999-2003 in cantons BE, JU, NE and TI.

School entry	BE		JU		NE		TI	
	KG		1.Kl		1.Kl		1.Kl	
	n	%	n	%	n	%	n	%
Number of classes	-		45		-		45	
Number of students	572		471		605		900	
Number of participating classes	-		35	77.8	-		42	93.3
Number of vaccination cards	512	89.5	0	0.0	371	61.3	758	84.2
Number of questionnaires	0	0.0	301	63.9	419	69.3	0	0.0
Total response (VC or Q):	512	89.5	301	63.9	421	69.6	758	84.2
Total nonresponse:	60	10.5	170	36.1	184	30.4	142	15.8

School departure	8.Kl		8.Kl		8.Kl		9.Kl	
	n	%	n	%	n	%	n	%
Number of classes	-		25		-		41	
Number of students	543		454		600		820	
Number of participating classes	-		24	96.0	-		34	82.9
Number of vaccination cards	492	90.6	0	0.0	281	46.8	686	83.7
Number of questionnaires	0	0.0	416	91.6	376	62.7	0	0.0
Total response (VC or Q):	492	90.6	416	91.6	381	63.5	686	83.7
Total nonresponse:	51	9.4	38	8.4	219	36.5	134	16.3

VC: vaccination card Q: questionnaire

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26:445-50.

JU: Vaccination coverage cannot be determined due to a misunderstanding; data collection per "Lungenliga" nurse.

BE, NE: same sampling procedure was used as with toddlers: simple random sampling of schoolchildren, who were directly contacted.

TI: Data collected by "Ufficio del medico cantonale" per school doctors in November 2002.

Annex E.1. Demographic comparison (%) of toddlers participating in the survey, with and without weights, nonresponse adjustments and poststratification, 1999-2003

			Survey				Swiss Federal		Survey				Swiss Federal		Survey				Swiss Federal	
			w/o adjust.		w/adjust.		Stats.Office		w/o adjust.		w/adjust.		Stats.Office		w/o adjust.		w/adjust.		Stats.Office	
KT	Canton	n	Swiss	Foreign.	Swiss	Foreign.	Swiss	Foreign.	Male	Female	Male	Female	Male	Female	City	Land	City	Land	City	Land
1	AG	321	90.0	10.0	72.4	27.6	72.4	27.6	47.7	52.3	51.3	48.7	51.3	48.7	63.6	36.4	57.9	42.1	57.9	42.1
2	AI	185	92.4	7.6	88.3	11.7	88.3	11.7	60.0	40.0	61.7	38.3	61.7	38.3	0.0	100.0	0.0	100.0	0.0	100.0
3	AR	270	92.6	7.4	81.0	19.0	81.0	19.0	54.1	45.9	52.0	48.0	48.0	52.0	55.9	44.1	46.9	53.1	46.9	53.1
4	BE	460	85.2	14.8	79.5	20.5	79.5	20.5	51.7	48.3	51.1	48.9	51.1	48.9	-	-	-	-	-	-
5	BL	337	87.5	12.5	75.2	24.8	75.1	24.9	48.7	51.3	52.3	47.7	52.3	47.7	73.3	26.7	77.5	22.5	77.5	22.5
6	BS	291	68.4	31.6	58.4	41.6	58.4	41.6	48.1	51.9	51.5	48.5	51.5	48.5	100.0	0.0	100.0	0.0	100.0	0
7	FR	281	94.3	5.7	80.0	20.0	80.0	20.0	52.3	47.7	50.4	49.6	50.4	49.6	34.5	65.5	35.0	65.0	35.0	65.0
8	GE	702	66.5	33.5	59.0	41.0	59.0	41.0	50.3	49.7	51.2	48.8	51.2	48.8	-	-	-	-	-	-
9	GL	272	86.0	14.0	76.4	23.6	76.4	23.6	51.8	48.2	53.4	46.6	53.4	46.6	0.0	100.0	0.0	100.0	0.0	100.0
10	GR	278	88.5	11.5	80.6	19.4	80.6	19.4	51.8	48.2	51.0	49.0	51.0	49.0	44.2	55.8	38.4	61.6	38.4	61.6
11	JU	237	94.1	5.9	85.2	14.8	85.2	14.8	51.5	48.5	50.2	49.8	50.2	49.8	20.3	79.7	14.9	85.1	14.8	85.2
12	LU	356	86.5	13.5	77.1	22.9	77.1	22.9	47.5	52.5	49.7	50.3	49.7	50.3	42.7	57.3	47.1	52.9	47.1	52.9
13	NE	335	85.1	14.9	71.9	28.1	71.9	28.1	55.8	44.2	50.8	49.2	50.8	49.2	60.0	40.0	71.3	28.7	71.3	28.7
14	NW	296	92.9	7.1	89.2	10.8	89.2	10.8	55.1	44.9	55.2	44.8	55.2	44.8	78.0	22.0	81.7	18.3	81.7	18.3
15	OW	240	92.1	7.9	86.2	13.8	86.2	13.8	55.8	44.2	55.3	44.7	55.2	44.8	0.0	100.0	0.0	100.0	0.0	100.0
16	SG	278	85.6	14.4	71.6	28.4	71.6	28.4	51.1	48.9	51.1	48.9	51.1	48.9	50.0	50.0	47.7	52.3	47.7	52.3
17	SH	365	81.1	18.9	69.6	30.4	69.6	30.4	55.3	44.7	53.3	46.7	46.7	53.3	64.9	35.1	71.5	28.5	71.5	28.5
18	SO	295	86.8	13.2	74.7	25.3	74.7	25.3	54.2	45.8	52.5	47.5	47.5	52.5	56.3	43.7	70.1	29.9	70.1	29.9
19	SZ	387	91.2	8.8	78.4	21.6	78.4	21.6	48.8	51.2	51.0	49.0	51.0	49.0	56.8	43.2	57.7	42.3	57.7	42.3
20	TG	235	80.0	20.0	75.1	24.9	75.1	24.9	54.5	45.5	51.6	48.4	51.6	48.4	32.3	67.7	37.7	62.3	37.7	62.3
21	TI	684	59.4	40.6	72.5	27.5	72.5	27.5	52.3	47.7	51.7	48.3	51.8	48.2	-	-	-	-	-	-
22	UR	289	95.2	4.8	90.8	9.2	90.8	9.2	51.9	48.1	51.8	48.2	51.7	48.3	0.0	100.0	0.0	100.0	0.0	100.0
23	VD	382	51.6	48.4	59.3	40.7	59.3	40.7	53.9	46.1	50.7	49.3	50.7	49.3	79.8	20.2	72.8	27.2	72.8	27.2
24	VS	353	90.7	9.3	75.3	24.7	75.3	24.7	53.0	47.0	51.7	48.4	51.7	48.3	44.8	55.2	51.2	48.8	51.2	48.8
25	ZG	255	87.8	12.2	74.9	25.1	74.9	25.1	54.9	45.1	50.2	49.7	50.2	49.8	81.6	18.4	83.4	16.6	83.4	16.6
26	ZH	345	78.6	21.4	70.6	29.3	70.6	29.4	51.9	48.1	52.1	47.8	52.1	47.9	85.5	14.5	89.7	10.3	89.7	10.3
27	**CH**	**8729**	**81.8**	**18.2**	**72.4**	**27.6**	**72.4**	**27.6**	**52.2**	**47.8**	**51.4**	**48.6**	**51.1**	**48.9**	**40.3**	**38.6**	**63.5**	**36.5**	**63.5**	**36.5**

Swiss Federal Statistical Office (SFSO): Data collected for the SFSO, but shared with ISPMZ by the Statistical Office in ZH. Total compiled between 1999-2003.
BE, GE, TI: data not collected for city / land. AI, BS, GL, 0W, UR: not poststratified by city /land. CH: n for city/land: 61518.
adj.: adjustments, includes weights, nonresponse adj., poststratification.

Annex E.2. Demographic comparison (%) of children at school entry participating in the survey, with and without weights, nonresponse adjustments and poststratification, 1999-2003

			Survey				Swiss Federal		Survey				Swiss Federal	
			w/o adjust.		w/adjust.		Stats.Office		w/o adjust.		w/adjust.		Stats.Office	
KT	Canton	n	Swiss	Foreigners	Swiss	Foreigners	Swiss	Foreigners	Male	Female	Male	Female	Male	Female
1	AG	470	81.1	18.9	77.0	23.0	77.0	23.0	49.6	50.4	51.0	49.0	51.0	49.0
2	AI	204	91.2	8.8	90.0	10.0	90.1	9.9	49.0	51.0	50.7	49.3	51.0	49.0
3	AR	308	78.2	21.8	86.4	13.6	86.4	13.6	52.9	47.1	51.0	49.0	51.0	49.0
4	BE	512	84.4	15.6	85.8	14.2	85.8	14.2	48.0	52.0	50.6	49.4	50.6	*49.4*
5	BL	412	72.6	27.4	79.4	20.6	79.4	20.6	50.2	49.8	51.0	49.0	51.0	49.0
6	BS	566	52.8	47.2	59.2	40.8	59.2	40.8	52.5	47.5	49.0	51.0	49.0	51.0
7	FR	313	93.3	6.7	82.0	18.0	82.0	18.0	46.3	53.7	51.0	49.0	51.0	49.0
8	GE	511	60.9	39.1	57.0	43.0	57.0	43.0	50.5	49.3	50.9	49.1	51.0	49.0
9	GL	254	72.8	27.2	74.7	25.3	74.7	25.3	51.6	48.4	52.8	47.2	52.8	47.2
10	GR	258	87.2	12.8	88.7	11.3	88.7	11.3	49.2	50.8	50.4	49.6	50.4	49.6
11	JU	301	91.0	9.0	87.1	12.9	87.1	12.9	49.5	50.5	48.0	52.0	48.0	52.0
12	LU	399	85.0	15.0	81.5	18.5	81.5	18.5	49.9	50.1	51.2	48.8	51.2	48.8
13	NE	371	84.1	15.9	74.1	25.9	74.1	25.9	52.3	47.7	51.0	49.0	51.0	49.0
14	NW	130	86.2	13.8	90.0	10.0	90.1	9.9	55.4	44.6	51.0	49.0	51.0	49.0
15	OW	82	91.5	8.5	89.0	11.0	89.0	11.0	53.7	46.3	51.0	49.0	51.0	49.0
16	SG	260	75.8	24.2	75.0	25.0	75.0	25.0	53.5	46.5	51.4	48.6	53.1	49.0
17	SH	340	79.1	20.9	76.0	24.0	76.0	24.0	50.6	49.4	50.5	49.5	50.5	49.5
18	SO	374	81.0	19.0	76.2	23.8	76.2	23.8	46.5	53.5	50.7	49.3	50.7	49.3
19	SZ	518	78.4	21.6	79.0	21.0	79.0	21.0	50.6	49.4	49.9	50.1	49.9	50.1
20	TG	342	76.0	24.0	79.7	20.3	79.7	20.3	45.0	55.0	51.0	49.0	51.0	49.0
21	TI	793	-	-	-	-	-	-	-	-	-	-	-	-
22	UR	248	82.7	17.3	87.4	12.6	87.4	12.6	51.2	48.8	51.0	49.0	51.0	49.0
23	VD	518	71.0	29.0	70.3	29.7	70.3	29.7	-	-	-	-	-	-
24	VS	309	83.2	16.8	80.6	19.4	80.6	19.4	49.5	50.5	51.0	49.0	51.0	49.0
25	ZG	122	83.6	16.4	78.0	22.0	78.0	22.0	49.2	50.8	51.8	48.2	51.0	49.0
26	ZH	538	77.7	22.3	74.6	25.4	74.6	25.4	51.5	48.5	49.3	50.7	49.3	50.7
27	**CH**	**8660**	**77.9**	**22.1**	**77.3**	**22.7**	**77.1**	**22.9**	**50.2**	**49.8**	**50.6**	**49.4**	**50.5**	**49.5**

Swiss Federal Statistical Office (SFSO): Figures provided by SFSO and cantonal offices of statistics. Total compiled for period between 1999-2003.

TI: poststratification not done, only nonresponse adjustment made; not included in totals. VD: not poststratified by sex. Hence, CH: n for sex: 8141

adj.: adjustments, includes weights, nonresponse adj., poststratification.

Annex E.3. Demographic comparison (%) of children at school departure participating in the survey, with and without weights, nonresponse adjustments and poststratification, 1999-2003

			Survey				Swiss Federal		Survey				Swiss Federal	
			w/o adjust.		w/adjust.		Stats.Office		w/o adjust.		w/adjust.		Stats.Office	
KT	Canton	n	Swiss	Foreigners	Swiss	Foreigners	Swiss	Foreigners	Male	Female	Male	Female	Male	Female
1	AG	532	79.9	20.1	77.0	23.0	77.0	23.0	50.8	49.2	51.0	49.0	51.0	49.0
2	AI	128	95.3	4.7	90.1	9.9	90.1	9.9	53.9	46.1	51.1	48.9	51.0	49.0
3	AR	317	89.3	10.7	86.4	13.6	86.4	13.6	48.3	51.7	51.0	49.0	51.0	49.0
4	BE	492	88.4	11.6	85.8	14.2	85.8	14.2	53.5	46.5	49.6	50.4	49.6	50.4
5	BL	347	81.3	18.7	79.4	20.6	79.4	20.6	47.0	53.0	51.0	49.0	51.0	49.0
6	BS	499	62.3	37.7	64.0	36.0	64.0	36.0	51.1	48.9	49.0	51.0	49.0	51.0
7	FR	372	84.9	15.1	82.0	18.0	82.0	18.0	52.4	47.6	51.0	49.0	51.0	49.0
8	GE	534	63.9	36.1	57.9	42.1	58.0	42.0	48.9	51.1	51.1	48.9	51.0	49.0
9	GL	264	69.7	30.3	74.0	26.0	74.0	26.0	50.8	49.2	51.2	48.8	51.2	48.8
10	GR	340	86.8	13.2	91.2	8.8	91.3	8.8	45.9	54.1	50.6	49.4	50.6	49.4
11	JU	416	90.4	9.6	87.1	12.9	87.1	12.9	46.9	53.1	48.1	51.9	48.1	51.9
12	LU	254	86.6	13.4	80.5	19.5	80.5	19.5	51.2	48.8	51.2	48.8	51.2	48.8
13	NE	281	86.1	13.9	77.7	22.3	77.7	22.3	49.1	50.9	51.0	49.0	51.0	49.0
14	NW	89	87.6	12.4	90.6	9.4	90.6	9.4	39.3	60.7	48.8	51.2	48.8	51.2
15	OW	61	96.7	3.3	88.9	11.1	88.8	11.2	55.7	44.3	50.5	49.5	50.9	49.1
16	SG	306	71.2	28.8	75.0	25.0	75.0	25.0	52.6	47.4	51.0	49.0	51.0	49.0
17	SH	457	73.3	26.7	77.5	22.5	77.5	22.5	48.1	51.9	50.9	49.1	50.9	49.1
18	SO	375	88.3	11.7	77.8	22.2	77.8	22.2	49.9	50.1	51.2	48.8	51.0	49.0
19	SZ	441	85.5	14.5	85.9	14.1	85.9	14.1	53.3	46.7	50.5	49.5	50.5	49.5
20	TG	365	82.5	17.5	79.7	20.3	79.7	20.3	52.3	47.7	51.0	49.0	51.0	49.0
21	TI	686	-	-	-	-	-	-	-	-	-	-	-	-
22	UR	302	88.1	11.9	89.9	10.1	89.9	10.1	51.0	49.0	51.1	48.9	51.1	48.9
23	VD	765	74.1	25.9	73.4	26.6	73.4	26.6	-	-	-	-	-	-
24	VS	371	82.2	17.8	80.6	19.4	80.6	19.4	45.0	55.0	51.0	49.0	51.0	49.0
25	ZG	59	91.5	8.5	78.0	22.0	78.0	22.0	50.8	49.2	51.0	49.0	51.0	49.0
26	ZH	444	74.3	25.7	74.6	25.4	74.6	25.4	51.4	48.6	50.2	49.8	50.2	49.8
27	**CH**	**8277**	**80.0**	**20.0**	**77.6**	**22.4**	**77.4**	**22.6**	**50.0**	**50.0**	**50.6**	**49.4**	**50.6**	**49.4**

Swiss Federal Statistical Office (SFSO): Figures provided by SFSO and cantonal offices of statistics. Total compiled for period between 1999-2003.
TI: poststratification not done, only nonresponse adjustment made; not included in totals. VD: not poststratified by sex. Hence, CH: n for sex: 8046
adj.: adjustments, includes weights, nonresponse adj., poststratification.

Annex F.1. Vaccination coverage of children 24-35 months at different DTPPolHibMMR series with and without including pertussis and Hib, 1999-2003

			33333111		44443111			33030111		44040111	
KT	Canton	n	%	95% CI	%	95% CI	n	%	95% CI	%	95% CI
1	AG	321	74.8	69.5, 80.1	66.6	60.4, 72.7	321	77.8	72.6, 83.1	69.3	63.2, 75.4
2	AI	185	66.7	62.6, 70.9	52.8	46.5, 59.2	185	69.8	65.7, 73.9	56.4	49.9, 62.8
3	AR	270	66.4	60.1, 72.8	61.6	54.9, 68.2	270	66.4	60.1, 72.8	61.6	54.9, 68.2
4	BE	460	76.8	72.8, 80.9	71.3	67.0, 75.5	460	77.4	73.4, 81.5	72.7	68.3, 77.1
5	BL	337	68.6	63.2, 74.0	58.7	53.6, 63.8	337	73.0	68.8, 77.2	63.1	58.3, 67.9
6	BS	291	68.1	62.4, 73.9	59.7	58.0, 61.4	291	71.6	65.6, 77.7	62.1	60.1, 64.1
7	FR	281	82.8	77.5, 88.2	75.2	69.6, 80.8	281	84.3	79.3, 82.3	75.5	69.8, 81.1
8	GE	702	87.4	85.3, 89.5	82.7	80.2, 85.2	702	89.2	87.1, 91.3	85.0	82.6, 87.4
9	GL	272	76.3	70.6, 81.9	71.5	65.9, 77.0	272	77.2	71.8, 82.7	73.1	67.9, 78.3
10	GR	278	74.2	69.6, 78.9	69.2	64.2, 74.1	278	75.6	70.9, 80.2	69.8	64.9, 74.8
11	JU	237	81.7	75.4, 88.1	77.0	71.4, 82.6	237	82.5	75.3, 89.6	77.7	71.7, 83,7
12	LU	356	67.0	60.4, 73.7	59.9	53.9, 66.0	356	68.5	62.3, 74.7	62.4	56.4, 68.4
13	NE	335	82.4	77.4, 87.4	76.1	70.3, 82.0	334	86.6	82.3, 90.9	80.3	75.5, 85.2
14	NW	296	75.0	67.7, 82.4	68.1	60.5, 75.7	296	75.3	68.0, 82.6	68.1	60.5, 75.6
15	OW	240	71.7	67.4, 76.0	66.0	61.2, 70.7	240	73.3	69.2, 77.3	67.5	62.2, 72.8
16	SG	278	73.8	67.7, 79.8	69.2	62.7, 75.7	278	75.0	69.2, 80.7	71.1	65.0, 77.3
17	SH	365	**49.4**	**45.1, 53.7**	**30.9**	**22.9, 39.4**	365	**51.0**	**46.9, 55.1**	**41.4**	**37.4, 45.4**
18	SO	295	77.8	71.6, 84.0	69.2	62.1, 76.3	295	79.0	72.8, 85.1	70.3	63.2, 77.4
19	SZ	387	78.4	73.4, 83.4	68.4	62.4, 74.4	387	78.6	73.6, 83.6	69.3	63.5, 75.1
20	TG	235	77.4	70.5, 84.2	65.6	57.4, 73.7	235	79.8	73.3, 86.2	68.5	61.0, 76.0
21	TI	683	**90.7**	**88.6, 92.8**	**84.9**	**81.8, 88.1**	684	**92.4**	**90.5, 94.3**	**87.1**	**84.1, 90.1**
22	UR	289	79.5	74.5, 84.6	74.6	70.5, 78.7	289	81.2	76.6, 85.8	75.6	71.6, 79.5
23	VD	382	86.3	83.1, 89.5	78.9	74.9, 82.9	382	87.4	84.4, 90.4	79.6	75.8, 83.4
24	VS	353	89.6	86.4, 92.7	77.5	71.9, 83.1	346	91.6	88.6, 94.6	82.3	77.5, 87.1
25	ZG	255	76.9	72.2, 81.6	72.7	68.7, 76.6	255	76.9	72.2, 81.6	72.7	68.7, 76.6
26	ZH	345	77.5	73.4, 81.6	69.1	63.3, 74.9	345	79.7	75.4, 84.0	73.6	67.5, 79.7
27	**CH**	**8716**	**78.0**	**76.5, 79.5**	**70.6**	**68.8, 72.4**	**8721**	**79.8**	**78.3, 81.2**	**73.0**	**71.3, 74.8**

CI: confidence interval

Annex F.2.1. Vaccination coverage of children at school entry at different DTPPolHibMMR series, including pertussis and Hib, 1999-2003

				33333111		44443111		55553111		55553222	
KT	Canton	Kl.	n	%	95% CI	%	95% CI	%	95% CI	%	95% CI
1	AG	1	469	69.4	64.8, 74.1	64.1	58.9, 69.3	21.0	14.1, 27.9	19.6	13.0, 26.1
2	AI	1	191	69.6	61.2, 78.0	53.2	36.0, 70.6	**48.6**	**29.2, 68.0**	**0.5**	**-0.5, 1.5**
3	AR	KG/ 1	308	78.1	70.5, 85.7	72.3	63.7, 80.9	47.0	32.3, 61.8	**42.2**	**27.2, 57.1**
4	BE	KG	512	58.8	54.5, 63.1	38.0	33.9, 42.0	3.2	1.6, 4.8	2.3	1.0, 3.5
5	BL	1	412	67.6	62.4, 72.8	35.5	31.1, 39.9	6.2	3.9, 8.6	2.0	0.3, 3.8
6	BS	3	531	61.9	56.6, 67.2	29.2	25.0, 33.4	3.9	2.2, 5.5	2.8	1.6, 4.1
7	FR	1	313	62.8	52.8, 72.8	25.9	17.7, 34.2	2.5	1.1, 3.8	1.4	0.3, 2.5
8	GE	1	508	76.6	71.6, 81.6	70.5	65.2, 75.8	16.2	11.9, 20.6	12.7	8.5, 16.9
9	GL	KG/ 1	250	76.8	70.0, 83.6	53.6	41.9, 65.3	20.3	7.5, 33.0	18.7	6.4, 30.9
10	GR	1	258	84.9	77.0, 92.7	70.6	54.8, 86.5	47.6	32.9, 62.3	31.1	16.2, 46.0
11	JU	1	-	-	-	-	-	-	-	-	-
12	LU	1	399	64.3	59.5, 69,0	46.0	39.8, 52.3	10.9	7.8, 14.0	7.2	5.0, 9.3
13	NE	1	371	65.2	61.1, 69.3	56.9	52.0, 61.9	15.4	12.1, 18.7	11.0	7.3, 14.6
14	NW	2	130	76.3	70.3, 82.3	57.5	44.0, 71.1	19.2	8.0, 30.4	16.8	5.6, 28.1
15	OW	1	82	57.3	32.6, 82.0	27.1	16.2, 38.0	13.6	4.1, 23.0	9.8	1.3, 18.4
16	SG	KG	260	81.4	76.2, 86.6	76.8	70.8, 84.7	26.8	14.2, 39.3	21.1	10.1, 32.2
17	SH	KG	340	**56.7**	**49.7, 63.7**	**25.1**	**16.4, 33.7**	5.1	-0.8, 11.0	3.1	-1.0, 7.2
18	SO	1	374	66.6	62.3, 70.9	31.8	26.8, 36.8	5.6	3.3, 7.8	4.0	2.1, 5.8
19	SZ	1	518	71.6	66.9, 76.3	61.7	56.9, 66.6	27.5	21.6, 33.4	25.0	19.8, 30.1
20	TG	KG	334	78.3	74,0, 82.5	28.4	22.6, 34.1	**0.9**	**-0.6, 1.8**	0.6	-0.2, 1.3
21	TI	1	787	**86.5**	**83.4, 89.7**	**83.9**	**80.5, 87.2**	42.1	36.6, 47.5	30.9	24.9, 36.9
22	UR	KG	248	76.9	70.6, 83,1	69.6	62.7, 76.6	19.3	6.5, 32.1	12.7	2.4, 22.9
23	VD	1	517	79.0	74.4, 83.6	75.0	68.5, 81.4	51.8	43.3, 60.2	13.7	9.6, 17.9
24	VS	1	309	68.7	64.1, 73.3	32.3	22.9, 41.7	2.5	0.3, 4.8	0.6	-0.2, 1.5
25	ZG	2	121	67.7	57.3, 78.0	39.1	28.4, 49.9	5.7	0.6, 10.8	3.3	-1.6, 8.3
26	ZH	1	538	61.4	56.0, 66.7	27.0	22.4, 31.6	3.6	1.7, 5.5	2.1	0.8, 3.4
27	**CH**		**9080**	**69.2**	**67.7, 70.6**	**49.2**	**47.5, 50.9**	**16.0**	**14.4, 17.5**	**9.9**	**8.7, 11.1**

CI: confidence interval
JU: not included since vaccination cards were not collected

Annex F.2.2. Vaccination coverage of children at school entry at different DTPPolHibMMR series, without including pertussis and Hib, 1999-2003

				33030111		44040111		55050111		55050222	
KT	Canton	Kl.	n	%	95% CI	%	95% CI	%	95% CI	%	95% CI
1	AG	1	469	83.4	79.4, 87.4	82.0	77.9, 86.1	68.8	63.4, 74.1	59.5	53.8, 65.4
2	AI	1	204	80.8	74.4, 87.2	74.5	66.2, 82.8	57.3	43.5, 71.2	**3.0**	**0.3, 5.8**
3	AR	KG/ 1	308	86.9	81.4, 92.4	83.8	77.6, 89.9	53.1	38.7, 67.6	44.3	29.0, 59.6
4	BE	KG	512	77.1	72.9, 81.3	74.9	70.4, 79.3	59.6	54.8, 64.4	22.6	19.0, 26.2
5	BL	1	412	81.8	76.9, 86.7	77.3	71.8, 82.9	50.4	45.3, 55.4	33.0	26.9, 39.1
6	BS	3	555	85.0	80.9, 89.1	78.0	73.7, 82.2	58.1	53.6, 62.7	46.4	40.9, 51.9
7	FR	1	313	77.6	69.6, 85.7	74.0	65.4, 82.6	52.2	43.3, 61.1	7.3	3.2, 11.4
8	GE	1	508	88.1	84.4, 91.8	81.2	76.5, 85.9	17.7	13.0, 22.4	13.7	9.2, 18.3
9	GL	KG/ 1	250	86.4	81.8, 91.0	84.1	79.0, 89.1	60.4	50.0, 70.8	54.2	45.1, 63.4
10	GR	1	258	89.8	83.9, 95.7	87.2	80.5, 93.9	66.9	57.2, 76.6	40.7	26.5, 54.8
11	JU	1	-	-	-	-	-	-	-	-	-
12	LU	1	399	84.9	81.1, 88.8	81.7	77.1, 86.2	50.0	44.2, 55.9	36.8	31.5, 42.2
13	NE	1	371	89.7	87.6, 91.9	87.9	85.2, 90.5	67.7	61.8, 73.7	48.4	39.7, 57.1
14	NW	2	130	89.6	87.5, 91.7	87.2	84.1, 90.2	68.9	59.5, 78.2	53.5	45.8, 61.1
15	OW	1	82	88.6	81.3, 95.9	87.5	80.0, 94.9	62.7	55.4, 69.9	42.2	27.9, 56.6
16	SG	KG	260	86.1	82.2, 89.9	81.4	76.0, 86.8	29.5	15.9, 43.1	23.5	11.5, 35.4
17	SH	KG	340	**61.6**	**54.7, 68.5**	**54.0**	**46.9, 61.2**	**8.6**	**2.8, 14.4**	3.1	-1.0, 7.2
18	SO	1	374	84.0	80.3, 87.7	81.3	77.3, 85.2	33.5	26.7, 40.3	24.4	18.3, 30.4
19	SZ	1	518	87.7	85.0, 90.4	86.1	83.0, 89.3	66.9	61.5, 72.6	**60.3**	**54.2, 66.4**
20	TG	KG	334	86.1	81.8, 90.4	81.8	76.3, 87.2	16.4	10.3, 22.5	10.8	6.5, 15.2
21	TI	1	789	**92.4**	**89.9, 94.9**	**90.0**	**87.3, 92.7**	45.4	39.8, 50.9	32.7	26.5, 38.9
22	UR	KG	248	85.0	79.2, 90.9	80.4	74.4, 86.3	23.0	8.6, 37.3	14.3	3.3, 25.3
23	VD	1	518	91.1	88.8, 93.5	90.0	87.6, 92.4	**74.3**	**70.1, 78.5**	19.5	13.8, 25.2
24	VS	1	309	89.0	85.7, 92.3	85.1	81.3, 88.9	47.2	38.8, 55.7	11.7	7.6, 15.7
25	ZG	2	122	80.9	72.8, 89.1	75.2	65.2, 85.1	57.4	48.6, 66.1	48.0	36.6, 59.4
26	ZH	1	538	85.6	81.8, 89.3	83.3	79.6, 87.1	60.6	54.3, 66.8	29.8	23.7, 35.8
27	**CH**		**9121**	**84.8**	**83.6, 85.9**	**81.7**	**80.5, 83.0**	**52.6**	**50.8, 54.5**	**29.6**	**27.8, 31.4**

CI: confidence interval
JU: not included since vaccination cards were not collected

Annex F.3.1. Vaccination coverage of children at school departure at different DTPPolMMR series including pertussis, 1999-2003

				3333111		4434111		5535111		5535222		6635111		6635222	
KT	Canton	Kl.	n	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
1	AG	8	530	77.4	72.7, 82.0	77.0	72.4, 81.6	74.9	70.5, 79.3	61.8	57.3, 66.3	62.7	57.9, 67.5	54.9	50.0, 59.8
2	AI	6	*128*	90.0	83.8, 96.2	82.4	73.0, 91.8	50.8	36.3, 65.2	24.1	1.4, 46.7	**12.9**	**-10.3, 36.1**	**11.9**	**-11.6, 35.3**
3	AR	8	317	81.8	76.7, 86.9	79.9	74.3, 85.4	66.5	57.0, 76.0	48.1	38.4, 57.8	45.6	36.9, 54.3	36.9	28.9, 45.0
4	BE	8	492	70.3	64.9, 75.7	70.1	64.6, 75.5	66.7	61.1, 72.4	35.0	30.7, 39.4	51.4	45.3, 57.5	29.8	25.4, 34.3
5	BL	9	347	77.7	71.4, 83.9	75.5	69.3, 81.8	65.8	59.3, 72.2	29.3	24.5, 34.0	42.3	37.0, 48.7	22.9	18.6, 27.1
6	BS	9	*487*	75.6	69.7, 81.6	75.2	69.1, 81.3	69.4	63.4, 75.4	57.2	51.4, 63.1	55.4	49.3, 61.4	48.1	42.3, 54.0
7	FR	8	371	71.2	66.8, 75.6	69.8	65.5, 74.2	61.3	55.4, 67.3	43.3	36.0, 50.7	38.1	30.2, 46.0	27.9	20.6, 35.2
8	GE	8	534	81.8	77.5, 86.0	81.0	76.8, 85.1	73.0	67.7, 78.3	49.9	44.8, 54.9	48.4	43.5, 53.3	39.8	35.3, 44.3
9	GL	8 / 9	263	85.8	81.4, 90.3	84.8	80.1, 89.5	76.7	69.4, 83.9	64.8	54.8, 78.9	50.3	33.2, 67.4	46.0	29.6, 62.4
10	GR	9	*340*	88.3	84.2, 92.4	87.3	82.5, 92.0	74.7	65.6, 83.8	42.3	31.4, 53.1	41.1	29.9, 52.3	29.1	19.8, 38.3
11	JU	8	-	-	-	-	-	-	-	-	-	-	-	-	-
12	LU	9	254	66.4	57.6, 75.3	65.5	57.0, 74.0	57.8	47.3, 68.2	33.9	22.6, 45.2	38.5	28.4, 48.6	24.9	15.2, 34.6
13	NE	8	279	77.8	73.6, 81.9	76.2	72.3, 80.1	68.8	63.8, 73.9	32.1	25.3, 38.9	27.9	23.3, 32.5	17.2	12.6, 21.8
14	NW	9	89	86.4	79.5, 93.3	85.4	79.0, 91.8	59.1	50.0, 68.2	48.9	42.7, 55.1	53.8	43.2, 64.3	45.5	37.4, 53.6
15	OW	8	61	**37.5**	**20.7, 54.2**	**37.5**	**20.7, 54.2**	**30.7**	**16.8, 44.6**	**6.1**	**2.5, 9.8**	17.2	8.4, 26.0	6.1	2.5, 9.8
16	SG	8	*296*	80.5	74.2, 86.7	79.8	73.5, 86.0	72.2	65.9, 78.5	38.7	26.3, 51.1	38.5	26.8, 50.2	24.3	13.7, 34.9
17	SH	8	*456*	70.1	61.7, 78.4	68.7	60.5, 76.9	57.8	50.2, 65.3	34.9	27.0, 42.8	20.5	13.6, 27.3	13.8	7.6, 19.9
18	SO	8	374	81.3	74.9, 87.7	80.4	74.3, 86.5	69.5	63.0, 76.0	19.7	14.4, 25.1	19.2	13.5, 24.9	10.7	6.4, 15.0
19	SZ	8	441	**93.1**	**89.8, 96.3**	**92.8**	**89.7, 96.0**	**89.6**	**85.9, 93.3**	**77.8**	**73.2, 82.5**	**76.9**	**72.1, 81.8**	**72.6**	**67.5, 77.7**
20	TG	8	365	71.6	64.9, 78.2	70.4	63.5, 77.3	60.5	53.8, 67.3	22.8	17.2, 28.4	35.2	26.8, 43.5	14.8	9.7, 19.9
21	TI	9	*681*	78.2	74.6, 81.7	78.0	74.5, 81.6	70.1	65.9, 74.2	45.7	41.6, 49.8	45.7	41.9, 49.5	36.4	32.7, 40.2
22	UR	8	302	91.0	87.0, 95.1	89.5	85.1, 93.8	83.4	77.6, 89.2	69.8	64.8, 74.9	20.2	6.7, 33.7	16.8	6.7, 26.9
23	VD	8	765	82.0	78.6, 85.4	81.2	77.8, 84.6	78.7	75.2, 82.1	65.7	61.6, 69.7	64.4	60.1, 68.8	56.8	52.4, 61.2
24	VS	8	371	73.3	68.3, 78.3	69.3	64.1, 74.5	47.6	40.3, 54.9	13.6	8.6, 18.6	13.9	8.0, 19.9	**3.5**	**0.8, 6.3**
25	ZG	9	59	89.5	82.3, 96.8	89.5	82.3, 96.8	86.5	76.4, 96.7	66.6	54.6, 78.5	66.6	48.5, 84.6	53.6	37.4, 69.8
26	ZH	8	*442*	74.0	67.7, 80.3	73.4	67.1, 79.7	63.0	56.5, 69.4	25.8	18.9, 32.7	39.2	31.8, 46.5	20.3	13.9, 26.8
	CH		**9044**	**76.5**	**74.9, 78.0**	**75.6**	**74.0, 77.1**	**68.0**	**66.3, 69.6**	**40.9**	**39.0, 42.8**	**44.9**	**42.9, 47.0**	**31.9**	**30.1, 33.7**

CI: confidence interval

JU: not included since vaccination cards were not collected

Annex F.3.2. Vaccination coverage of children at school departure at different DTPPolMMR series without including pertussis, 1999-2003

				3303111		4404111		5505111		5505222		6605111		6605222	
KT	Canton	Kl.	n	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI	%	95% CI
1	AG	8	530	85.5	81.3, 89.7	83.9	79.4, 88.4	81.0	76.7, 85.4	66.5	61.9, 71.1	67.9	62.7, 73.0	59.0	53.8, 64.2
2	AI	6	128	**95.3**	**91.7, 98.8**	88.7	81.9, 95.4	63.9	48.5, 79.3	18.8	0.7, 37.0	17.4	-2.9, 37.7	9.3	- 8.9, 27.4
3	AR	8	317	85.5	81.1, 89.9	82.0	76.9, 87.1	67.4	58.0, 76.8	48.4	38.7, 58.1	46.2	37.5, 54.8	36.9	28.8, 45.0
4	BE	8	492	**74.1**	**69.5, 78.7**	73.2	68.2, 78.2	67.9	62.5, 73.3	35.2	30.9, 39.6	51.8	45.5, 58.1	29.8	25.4, 34.3
5	BL	9	347	84.8	78.5, 91.2	81.4	75.2, 87.6	70.4	63.9, 76.9	30.6	25.8, 35.5	45.2	39.5, 50.9	24.0	19.8, 28.1
6	BS	9	487	84.4	80.7, 88.1	77.8	73.3, 82.4	68.4	63.5, 73.3	56.8	51.8, 61.9	52.8	46.8, 58.7	45.5	40.0, 51.0
7	FR	8	371	81.4	76.9, 85.8	78.9	74.7, 83.2	67.6	62.8, 72.5	48.3	40.7, 55.9	40.7	33.3, 48.2	30.0	22.6, 37.4
8	GE	8	534	85.7	81.4, 90.0	83.8	79.5, 88.1	75.0	69.8, 80.2	51.0	45.9, 56.1	49.1	44.2, 54.0	40.3	35.9, 44.8
9	GL	8 / 9	263	90.9	87.6, 94.2	88.8	85.6, 92.1	78.6	72.0, 85.2	66.5	56.5, 76.5	51.5	35.2, 67.8	47.3	31.6, 63.0
10	GR	9	340	89.7	85.8, 93.5	88.4	83.9, 92.8	75.4	66.8, 84.0	41.1	30.3, 52.0	43.4	32.6, 54.3	28.3	19.4, 37.2
11	JU	8	-	-	-	-	-	-	-	-	-	-	-	-	-
12	LU	9	254	86.0	78.4, 93.6	83.2	75.7, 90.7	73.8	65.4, 82.2	42.4	31.8, 53.0	49.1	39.0, 59.2	31.5	22.1, 41.0
13	NE	8	279	79.6	75.7, 83.6	77.4	73.5, 81.4	68.8	63.8, 73.9	32.1	25.3, 38.9	27.9	23.3, 32.5	17.2	12.6, 21.8
14	NW	9	89	91.8	86.7, 96.9	90.8	85.8, 95.8	63.1	52.0, 74.1	52.8	44.8, 60.9	56.7	43.8, 69.6	48.4	38.0, 58.8
15	OW	8	61	84.7	69.4, 99.9	81.6	66.0, 97.2	55.2	47.0, 63.5	**9.2**	**3.3, 15.1**	21.5	14.0, 29.0	9.2	3.3, 15.1
16	SG	8	296	86.0	81.2, 90.9	84.2	78.9, 89.4	74.5	68.6, 80.3	40.8	28.3, 53.3	39.6	28.4, 50.8	25.5	15.2, 35.8
17	SH	8	456	**74.1**	**66.4, 81.8**	**70.7**	**63.3, 78.2**	59.0	52.1, 66.0	35.9	28.1, 43.6	20.6	13.6, 27.5	13.9	7.6, 20.2
18	SO	8	374	87.4	82.2, 92.5	85.9	80,9, 91.0	73.4	67.2, 79.5	20.2	15.0, 25.5	19.9	14.1, 25.7	10.7	6.4, 15.0
19	SZ	8	441	95.1	92.5, 97.6	**94.2**	**91.6, 96.8**	**90.5**	**87.2, 93.9**	**78.5**	**73.9, 83.1**	**77.4**	**72.6, 82.1**	**73.1**	**68.0, 78.1**
20	TG	8	365	81.4	76.0, 86.9	77.9	71.7, 84.0	65.6	58.6, 72.7	25.4	19,1, 31.7	37.8	29.0, 46.5	16.6	11.4, 21.9
21	TI	9	681	87.2	85.0, 89.4	86.3	84.0, 88.7	75.9	72.6, 79.2	48.2	44.3, 52.1	48.5	44.7, 52.2	38.5	34.7, 42.2
22	UR	8	302	94.7	91.3, 98.1	92.4	88.8, 96.1	84.1	78.7, 89.4	70.5	65.5, 75.5	20.5	7.0, 34.1	17.1	6.9, 27.3
23	VD	8	765	90.6	88.5, 92.6	88.4	86.2, 90.7	83.2	80.0, 86.3	69.0	65.1, 72.8	66.9	62.5, 71.4	58.9	54.4, 63.3
24	VS	8	371	78.3	73.5, 83.0	72.1	66.5, 77.7	**49.1**	**41.3, 56.9**	14.3	9.3, 19,3	**14.2**	**8.1, 20.2**	**3.8**	**0.7, 6.8**
25	ZG	9	59	91.0	83.7, 98.3	91.0	83.7, 98.3	88.0	78.3, 97.7	68.1	55.3, 80.8	66.6	48.5, 84.6	53.6	37.4, 69.9
26	ZH	8	442	83.8	78.9, 88.8	80.0	74.6, 85.4	66.8	60.0, 73.6	27.9	20,4, 35.5	41.3	33.7, 48.9	21.4	14.6, 28.1
27	**CH**		**9044**	**84.2**	**82.9, 85.4**	**81.7**	**80.4, 83.1**	**72.1**	**70.5, 73.7**	**43.2**	**41.2, 45.2**	**47.2**	**45.1, 49.2**	**33.3**	**31.5, 35.2**

CI: confidence interval

JU: not included since vaccination cards were not collected

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Diphtheria

	24-35 months				School entry					School departure			
	n	≥3 D.	≥4 D.	Kl.	n	≥3 D.	≥4 D.	≥5 D.	Kl.	n	≥4 D.	≥5 D.	≥6 D.
AG	321	95.0	83.1	1	470	96.7	94.3	78.7	8	531	89.1	87.4	71.8
AI	185	90.9	**66.8**	1	204	98.0	**83.2**	59.2	6	128	93.3	68.9	17.4
AR	270	91.1	78.7	KG/ 1	308	98.4	93.7	58.9	8	317	90.3	77.2	51.5
BE	460	95.2	84.2	KG	512	96.4	92.4	71.6	8	492	94.3	87.4	64.5
BL	337	95.4	78.2	1	412	95.8	90.9	62.7	9	347	88.5	78.6	47.7
BS	291	94.7	78.7	3	564	96.8	87.5	71.2	9	490	85.1	78.3	56.6
FR	281	98.2	83.5	1	313	**94.1**	87.4	64.4	8	372	91.0	79.5	45.3
GE	702	97.9	89.8	1	508	97.0	88.7	19.2	8	534	91.3	83.8	53.1
GL	272	95.1	86.2	KG/ 1	254	96.1	92.3	68.9	8 / 9	263	91.1	82.9	52.6
GR	278	94.7	82.5	1	258	98.4	95.4	73.2	9	340	**95.9**	84.7	46.9
JU	237	95.8	90.4	1	301	-	-	-	8	416	-	-	-
LU	356	90.4	76.2	1	399	97.6	92.4	57.5	9	254	89.8	82.8	53.1
NE	335	96.7	87.9	1	371	97.5	**95.6**	74.9	8	279	92.3	80.3	29.2
NW	296	92.2	82.2	2	130	97.9	95.0	**80.9**	9	89	93.5	87.9	72.8
OW	240	**88.7**	78.8	1	82	97.6	94.7	74.1	8	61	88.3	65.1	27.0
SG	278	93.6	83.8	KG	260	97.7	90.2	33.4	8	300	88.5	79.8	42.9
SH	365	95.4	79.0	KG	340	98.3	86.9	**14.6**	8	456	83.2	73.1	24.6
SO	295	97.1	82.4	1	374	98.1	92.9	39.2	8	374	88.5	80.8	21.2
SZ	387	93.0	79.4	1	518	94.7	92.1	72.5	8	441	95.4	**94.0**	**78.8**
TG	235	95.7	84.1	KG	334	98.0	92.3	19.8	8	365	87.1	76.5	40.3
TI	684	**98.5**	**92.4**	1	793	98.2	95.2	50.2	9	682	94.3	84.0	50.6
UR	289	96.4	87.1	KG	248	97.3	93.6	25.8	8	302	95.7	89.4	21.9
VD	382	97.8	84.9	1	518	**98.8**	95.5	78.4	8	765	94.8	90.6	70.2
VS	353	96.2	88.2	1	309	95.5	89.9	51.3	8	371	**81.6**	**56.3**	**15.8**
ZG	255	92.9	82.2	2	122	95.9	91.3	73.5	9	59	92.5	88.0	66.6
ZH	345	95.1	82.7	1	538	97.2	93.7	66.9	8	444	87.3	77.0	44.5
CH	**8729**	**95.4**	**83.6**		**9139**	**97.1**	**92.5**	**60.0**		**9056**	**90.2**	**81.6**	**51.4**
CH 98	403	94.3	71.7	BAG. BAG Bulletin 1999; Nr. 20: 356-361.									
CH 91	402	95.0	71.1	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.									

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26:445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.

Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Tetanus

	24-35 months				School entry					School departure			
	n	≥3 D.	≥4 D.	Kl.	n	≥3 D.	≥4 D.	≥5 D.	Kl.	n	≥4 D.	≥5 D.	≥6 D.
AG	321	95.5	82.9	1	470	96.7	94.3	78.7	8	531	89.1	87.4	72.0
AI	185	92.4	**67.2**	1	204	98.5	**85.6**	59.7	6	128	96.2	69.6	**17.4**
AR	270	91.1	78.7	1	308	98.0	93.0	58.6	8	317	90.6	77.2	51.5
BE	460	95.4	84.8	KG	512	96.7	92.4	71.7	8	492	94.9	88.4	64.7
BL	337	96.4	78.2	1	412	96.3	91.2	63.2	9	347	88.8	79.2	49.4
BS	291	95.0	79.3	3	564	96.8	87.9	71.5	9	490	85.5	78.9	56.7
FR	281	98.2	83.5	1	313	**94.1**	87.4	64.4	8	372	90.8	80.5	47.2
GE	702	98.2	89.5	1	508	97.3	89.5	**19.4**	8	534	91.6	84.0	54.5
GL	272	95.8	86.6	1	254	96.1	92.3	68.5	8 / 9	263	90.7	83.7	53.0
GR	278	95.0	82.5	1	258	98.8	95.4	73.2	9	340	**96.2**	85.7	46.9
JU	237	95.8	90.0	1	301	-	-	-	8	416	-	-	-
LU	356	90.6	76.7	1	399	97.6	92.6	58.6	9	254	89.8	83.1	52.8
NE	335	97.9	87.7	1	371	98.4	95.9	75.1	8	279	92.3	81.0	29.5
NW	296	92.2	82.2	2	130	97.9	95.0	**80.9**	9	89	93.5	87.9	73.7
OW	240	**89.9**	79.1	1	82	97.6	94.7	74.1	8	61	93.9	65.1	27.0
SG	278	93.8	84.3	KG	260	97.7	90.2	33.4	8	300	88.8	79.9	42.5
SH	365	96.3	79.0	KG	340	98.3	86.6	14.6	8	456	83.4	73.0	24.4
SO	295	97.5	82.4	1	374	98.1	92.9	39.2	8	374	89.3	81.0	22.4
SZ	387	93.4	79.8	1	518	94.7	92.0	71.9	8	441	95.4	**94.0**	**78.8**
TG	235	95.7	84.1	KG	334	98.0	92.6	20.4	8	365	86.8	76.2	41.1
TI	684	98.5	**92.4**		792	98.2	95.2	50.3	9	682	94.3	84.0	51.2
UR	289	96.4	87.1	KG	248	97.7	93.6	25.8	8	302	96.0	89.4	21.5
VD	382	**98.5**	84.9	1	518	**98.8**	**95.7**	78.2	8	765	94.7	90.1	69.9
VS	353	98.1	88.9	1	309	97.7	91.2	51.7	8	371	**82.8**	**58.9**	17.3
ZG	255	93.2	82.2	2	122	95.9	91.3	73.5	9	59	92.5	88.0	66.6
ZH	345	95.6	82.7	1	538	97.4	94.0	67.1	8	444	88.0	78.6	46.5
CH	**8729**	**95.9**	**83.7**		**9138**	**97.3**	**92.7**	**60.2**		**9056**	**90.5**	**82.2**	**52.1**
CH 98	403	93.3	71.5	BAG. BAG Bulletin 1999; Nr. 20: 356-361.									
CH 91	402	93.3	70.9	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.									

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Pertussis

	24-35 months				School entry					School departure			
	n	≥3 D.	≥4 D.	Kl.	n	≥3 D.	≥4 D.	≥5 D.	Kl.	n	≥3 D.	≥4 D.	≥5 D.
AG	321	91.9	81.0	1	470	89.9	81.3	27.6	8	531	80.3	7.8	1.2
AI	185	89.8	**63.7**	1	191	94.3	58.9	49.1	**6**	100	**95.0**	12.2	-
AR	270	88.7	77.6	1	308	96.0	86.1	54.6	8	317	90.1	4.8	1.1
BE	460	92.8	82.4	KG	512	81.4	53.5	4.7	8	492	90.0	-	-
BL	337	89.8	75.1	1	412	82.1	40.4	7.8	9	347	81.9	8.6	1.4
BS	291	90.4	76.8	3	546	82.1	39.9	7.8	9	431	80.8	8.5	1.6
FR	281	95.9	82.9	1	313	82.7	35.0	3.5	8	372	78.0	10.5	1.9
GE	702	96.9	89.2	1	508	96.6	86.6	19.0	8	534	88.7	23.1	8.2
GL	272	94.8	86.2	1	254	93.4	60.3	20.7	8 / 9	263	87.7	9.4	5.6
GR	278	92.4	81.9	1	258	94.1	77.7	51.5	9	319	94.9	18.0	9.7
JU	237	94.5	89.1	1	301	-	-	-	8	416	-	-	-
LU	356	86.2	72.8	1	399	79.2	52.5	12.9	9	254	70.8	7.4	0.9
NE	335	94.9	85.9	1	371	94.7	78.0	21.0	8	279	90.4	**28.7**	14.0
NW	296	90.3	79.6	2	130	87.8	63.0	22.4	9	89	87.4	11.8	3.1
OW	240	**86.0**	76.8	1	82	**64.0**	**32.1**	19.6	8	61	**41.1**	4.3	3.1
SG	278	91.9	82.6	KG	260	95.4	86.8	29.9	8	295	83.7	7.5	2.3
SH	365	93.1	64.5	KG	340	94.6	37.9	6.6	8	454	81.4	7.8	3.6
SO	295	94.9	80.2	1	374	90.8	40.0	6.5	8	374	83.0	9.6	**0.2**
SZ	387	90.8	77.9	1	518	91.4	76.7	34.8	8	441	93.5	**0.7**	-
TG	235	92.9	80.5	KG	334	95.1	36.2	**1.2**	8	365	78.9	6.9	0.8
TI	684	**97.8**	**92.0**	1	792	**96.8**	**92.8**	48.4	9	682	83.3	22.1	7.2
UR	289	93.4	84.8	KG	248	94.0	84.8	22.5	8	302	93.7	25.6	**22.5**
VD	382	95.5	84.3	1	518	94.0	88.4	**61.9**	8	765	86.8	26.3	5.7
VS	353	95.6	82.7	1	309	88.4	39.2	4.5	8	371	82.8	6.9	1.0
ZG	255	91.0	81.7	2	122	89.1	53.6	8.7	9	59	92.4	14.5	8.9
ZH	345	91.9	78.6	1	538	88.5	37.5	5.2	8	442	81.4	11.9	2.0
CH	**8729**	**92.9**	**81.3**		**9107**	**88.9**	**60.9**	**19.4**		**8939**	**83.5**	**12.9**	**3.4**
CH 98	403	88.1	68.2	BAG. BAG Bulletin 1999; Nr. 20: 356-361.									
CH 91	402	88.8	-	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.									

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Polio

	24-35 months			School entry					School departure				
	n	>3 D.	>4 D.	Kl.	n	>3 D.	>4 D.	>5 D.	Kl.	n	>3 D.	>4 D.	>5 D.
AG	321	96.6	83.5	1	470	96.6	94.1	**78.8**	8	531	90.4	88.9	85.7
AI	185	92.4	70.7	1	204	97.0	84.7	58.8	6	128	98.4	94.7	68.3
AR	270	90.8	77.8	KG/1	308	98.2	92.7	57.8	8	317	93.4	90.2	76.0
BE	460	94.6	86.1	KG	512	96.5	92.2	71.3	8	492	95.7	93.5	87.8
BL	337	94.6	75.3	1	412	95.3	87.9	55.9	9	347	90.4	86.7	74.1
BS	291	94.6	77.3	3	562	96.7	87.5	64.7	9	490	93.5	86.3	75.1
FR	281	97.6	81.9	1	313	**93.5**	88.0	59.9	8	371	91.3	86.4	74.7
GE	702	96.7	89.5	1	508	96.0	87.1	19.5	8	534	94.3	91.1	81.9
GL	272	95.5	84.9	KG/1	254	95.8	91.9	66.5	8 / 9	263	93.9	92.2	82.5
GR	278	93.4	82.2	1	258	98.0	95.3	70.8	9	340	**98.4**	**96.2**	82.9
JU	237	95.0	88.1	1	301	-	-	-	8	416	-	-	-
LU	356	90.6	75.3	1	399	97.1	92.8	59.3	9	254	92.1	88.5	78.5
NE	335	96.7	86.8	1	371	98.6	95.6	73.8	8	281	94.9	92.6	78.9
NW	296	91.9	80.2	2	130	97.4	95.0	73.3	9	89	92.8	91.8	**64.0**
OW	240	**89.1**	78.0	1	82	96.1	91.0	68.6	8	61	87.7	**84.1**	67.5
SG	278	93.7	83.8	KG	260	98.1	86.8	31.4	8	298	91.0	89.1	79.7
SH	365	94.3	**61.1**	KG	340	96.8	**73.6**	**9.2**	8	457	**86.0**	84.2	73.8
SO	295	96.8	80.1	1	374	98.1	92.1	37.0	8	374	91.5	89.3	77.5
SZ	387	93.0	78.9	1	518	95.6	92.5	70.9	8	441	95.5	94.6	**91.7**
TG	235	95.8	79.1	KG	334	98.4	91.7	18.1	8	365	89.8	85.3	75.0
TI	684	97.8	**90.8**	1	791	98.4	94.9	47.7	9	682	94.6	93.0	81.8
UR	289	96.4	85.2	KG	248	97.7	90.2	25.5	8	302	98.3	96.0	87.1
VD	382	96.9	82.7	1	518	**98.8**	**95.9**	77.6	8	765	97.3	94.2	89.3
VS	353	**97.8**	87.0	1	309	96.3	94.3	72.5	8	371	91.8	89.5	83.3
ZG	255	91.6	81.2	2	122	95.9	87.8	66.6	9	59	97.1	92.5	91.0
ZH	345	95.3	82.0	1	538	96.9	93.2	66.0	8	442	91.7	87.0	72.8
CH	**8729**	**95.3**	**82.7**		**9135**	**97.0**	**92.0**	**59.6**		**9054**	**93.0**	**90.0**	**80.7**
CH 98	403	92.1	76.2										
CH 91	402	94.8	70.4										

BAG. BAG Bulletin 1999; Nr. 20: 356-361.
Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age and at school entry, 1999-2003

Haemophilus influenzae type B

	24-35 months				School entry		
	n	≥3 D.	≥4 D.	Kl.	n	≥3 D.	≥4 D.
AG	321	89.9	80.7	1	469	78.8	28.7
AI	185	87.3	**60.8**	1	191	73.7	48.6
AR	270	88.5	76.2	KG/ 1	308	85.7	57.3
BE	460	90.7	80.0	KG	512	72.1	-
BL	337	86.3	68.3	1	412	81.4	11.0
BS	291	87.8	71.8	3	532	74.2	7.2
FR	281	92.5	83.6	1	313	69.4	9.4
GE	702	93.8	86.2	1	509	81.7	47.9
GL	272	93.8	81.1	KG/ 1	250	83.4	46.2
GR	278	91.0	82.0	1	258	91.2	51.5
JU	237	92.5	85.7	1	301	-	-
LU	356	86.1	73.9	1	399	79.8	18.4
NE	335	90.8	75.5	1	371	70.3	6.1
NW	296	88.7	74.8	2	130	84.8	32.1
OW	240	**86.0**	76.4	1	82	**91.3**	40.3
SG	278	89.7	79.2	KG	260	89.9	64.0
SH	364	91.1	78.6	KG	340	83.8	37.4
SO	295	93.5	76.1	1	374	80.7	15.3
SZ	387	91.3	77.3	1	518	76.2	33.5
TG	235	90.9	77.8	KG	334	89.2	21.7
TI	679	**96.0**	**87.1**	1	790	91.0	**80.1**
UR	289	91.4	84.8	KG	248	84.1	46.7
VD	382	94.4	81.1	1	517	82.5	29.5
VS	353	93.6	78.7	1	309	75.2	8.1
ZG	255	90.5	79.8	2	121	76.8	7.4
ZH	345	91.1	78.8	1	538	**67.5**	**3.0**
CH	**8723**	**91.1**	**79.3**		**9085**	**78.3**	**26.6**

CH 98	403	76.9	47.4	BAG. BAG Bulletin 1999; Nr. 20: 356-361.
CH 91	402	-	-	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Measles

	24-35 months			School entry				School departure			
	n	≥1 D.	Kl.	n	≥1 D.	≥2 D.		Kl.	n	≥1 D.	≥2 D.
AG	321	82.5	1	469	88.3	68.4		8	532	96.2	75.8
AI	185	71.3	1	204	81.8	**3.5**		6	128	95.3	19.6
AR	270	**68.6**	KG/1	308	88.2	48.4		8	317	92.0	57.5
BE	460	77.6	KG	512	82.7	25.4		8	492	92.3	52.2
BL	337	75.6	1	412	85.2	42.0		9	347	92.2	33.5
BS	291	78.5	3	559	88.9	62.5		9	489	95.0	75.5
FR	281	86.0	1	313	84.0	10.7		8	372	89.3	59.8
GE	702	92.7	1	509	91.2	29.4		8	534	91.7	57.2
GL	272	77.9	KG/1	250	89.5	63.1		8 / 9	264	96.6	77.3
GR	278	78.7	1	258	91.0	45.7		9	340	93.4	46.4
JU	237	83.5	1	301	-	-		8	416	-	-
LU	356	71.4	1	399	89.2	45.1		9	254	97.2	50.6
NE	334	89.4	1	371	92.2	58.6		8	281	**84.0**	36.4
NW	296	80.2	2	130	92.0	63.1		9	89	99.0	78.1
OW	240	73.7	1	82	91.3	51.1		8	61	87.7	**13.5**
SG	278	76.1	KG	260	88.1	32.0		8	303	96.0	51.1
SH	365	75.0	KG	340	**80.7**	4.3		8	457	91.9	54.1
SO	295	81.0	1	374	86.8	26.9		8	374	96.8	27.1
SZ	387	80.0	1	518	91.9	**69.6**		8	441	**99.1**	**82.6**
TG	235	84.1	KG	334	88.6	16.0		8	365	93.7	39.9
TI	684	**93.7**	1	791	**93.8**	46.5		9	685	91.2	54.3
UR	289	83.2	KG	248	87.0	17.2		8	302	95.8	77.9
VD	382	89.7	1	518	91.9	23.8		8	765	93.4	76.0
VS	346	92.9	1	309	92.4	17.7		8	371	94.8	34.2
ZG	255	77.1	2	122	82.8	59.1		9	59	92.4	69.4
ZH	345	81.4	1	538	89.9	35.6		8	444	94.2	41.7
CH	**8721**	**82.3**		**9128**	**88.4**	**36.6**			**9066**	**93.8**	**54.0**

CH 98	403	81.4	BAG. BAG Bulletin 1999; Nr. 20: 356-361.
CH 91	401	83.1	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Mumps

	24-35 months			School entry				School departure			
	n	≥1 D.	Kl.	n	≥1 D.	≥2 D.	Kl.	n	≥1 D.	≥2 D.
AG	321	79.7	1	469	86.4	66.8	8	532	95.9	75.8
AI	185	71.3	1	204	81.8	**3.0**	6	128	95.3	19.6
AR	270	**66.8**	KG/ 1	308	88.2	48.1	8	317	93.0	57.5
BE	460	77.6		512	79.1	25.4		492	90.9	49.0
BL	337	73.7	1	412	84.1	42.0	9	347	92.0	33.3
BS	291	74.3	3	559	87.3	60.6	9	489	93.6	74.1
FR	281	84.6	1	313	82.0	10.1	8	372	88.0	58.0
GE	702	90.3	1	509	89.9	29.2	8	534	89.8	55.0
GL	272	77.6	KG/ 1	250	89.1	63.5	8 / 9	264	96.6	76.6
GR	278	76.6	1	258	90.2	45.3	9	340	91.5	46.1
JU	237	83.3	1	301	-	-	8	416	-	-
LU	356	69.6	1	399	86.3	44.3	9	254	96.9	50.6
NE	334	89.0	1	371	91.3	57.4	8	281	**81.8**	35.3
NW	296	75.6	2	130	91.2	63.1	9	89	99.0	78.1
OW	240	73.3	1	82	91.3	51.1	8	61	86.5	**12.3**
SG	278	75.8	KG	260	87.7	31.3	8	303	95.7	50.8
SH	365	69.2	KG	340	**76.4**	4.1	8	457	90.8	53.7
SO	295	79.9	1	374	84.6	26.9	8	374	96.6	25.6
SZ	387	79.1	1	518	91.7	**69.4**	8	441	**99.1**	**82.6**
TG	235	82.2	KG	334	87.3	15.7	8	365	93.4	39.9
TI	684	**93.3**	1	790	**93.7**	45.8	9	685	90.1	54.2
UR	289	81.5	KG	248	85.3	17.2	8	302	95.8	77.9
VD	382	88.7	1	518	91.7	23.6	8	765	93.4	75.9
VS	346	92.6	1	309	92.0	16.7	8	371	93.5	30.4
ZG	255	77.1	2	122	82.1	59.1	9	59	92.4	69.4
ZH	345	81.1	1	538	88.9	34.8	8	444	94.0	39.4
CH	**8721**	**81.1**		**9127**	**87.0**	**36.0**		**9066**	**93.1**	**52.7**
CH 98	403	78.9	BAG. BAG Bulletin 1999; Nr. 20: 356-361.							
CH 91	401	80.1	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.							

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland 24-35 months of age, at school entry and school departure, 1999-2003

Rubella

	24-35 months			School entry				School departure			
	n	≥1 D.		Kl.	n	≥1 D.	≥2 D.	Kl.	n	≥1 D.	≥2 D.
AG	321	78.4		1	469	86.0	66.8	8	532	95.0	74.1
AI	185	71.3		1	204	81.8	**3.0**	6	128	95.3	19.6
AR	270	66.8		KG/1	308	88.2	48.3	8	317	92.0	57.2
BE	460	77.6		KG	512	78.7	25.4	8	492	**79.5**	38.2
BL	337	73.6		1	412	83.9	41.6	9	347	92.2	32.7
BS	291	74.1		3	559	87.5	60.5	9	489	93.2	73.1
FR	281	84.6		1	313	81.3	10.1	8	372	88.0	59.4
GE	702	90.4		1	509	89.5	29.0	8	534	89.0	55.0
GL	272	77.6		KG/1	250	89.5	63.5	8 / 9	264	96.6	76.6
GR	278	76.1		1	258	90.2	45.3	9	340	90.8	45.7
JU	237	83.3		1	301	-	-	8	416	-	-
LU	356	68.8		1	399	85.8	44.3	9	254	95.2	51.3
NE	334	89.4		1	371	91.1	57.2	8	281	82.4	35.3
NW	296	76.2		2	130	90.5	63.1	9	89	**100.0**	80.1
OW	240	73.3		1	82	89.8	49.6	8	61	86.5	**12.3**
SG	278	75.8		KG	260	87.7	31.3	8	303	95.3	50.8
SH	365	**51.3**		KG	340	**61.9**	4.1	8	457	87.2	48.0
SO	295	79.9		1	374	84.6	26.9	8	374	95.9	24.4
SZ	387	79.3		1	518	91.7	**69.6**	8	441	99.1	**82.6**
TG	235	81.7		KG	334	87.3	15.7	8	365	90.8	30.2
TI	684	**93.3**			791	**93.7**	45.8	9	685	89.8	53.9
UR	289	81.8		KG	248	85.3	17.2	8	302	95.8	77.9
VD	382	88.7		1	518	91.7	23.6	8	765	93.1	75.3
VS	346	92.6		1	309	92.7	17.4	8	371	89.1	29.0
ZG	255	76.9		2	122	82.1	58.4	9	59	92.4	68.1
ZH	345	81.1		1	538	88.3	34.3	8	444	90.2	33.0
CH	**8721**	**80.8**			**9128**	**86.6**	**35.9**		**9066**	**90.6**	**49.8**

CH 98	403	78.7	BAG. BAG Bulletin 1999; Nr. 20: 356-361.
CH 91	401	79.6	Minder C, Steffen R. BAG Bulletin 1992; Nr. 32: 504-507.

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale. Instead of 24-35 months of age, data was collected from the children in kindergarten.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex F.4 Vaccination coverage of children in Switzerland at school departure, 1999-2003

Hepatitis B

	School departure				
	Kl.	n	≥1 D.	≥2 D.	≥3 D.
AG	8	532	31.3	26.7	12.6
AI	6	128	**7.5**	**6.7**	**2.3**
AR	8	317	23.2	15.5	12.8
BE	8	492	44.7	41.3	35.0
BL	9	347	62.5	59.8	31.9
BS	9	479	72.5	71.0	67.9
FR	8	372	69.3	69.3	**68.3**
GE	8	534	57.6	54.7	21.2
GL	8 / 9	264	54.7	49.0	43.0
GR	9	340	32.5	27.1	23.5
JU	8	416	-	-	-
LU	9	254	49.3	47.1	39.7
NE	8	281	28.0	22.3	13.0
NW	9	89	**88.3**	**82.0**	9.0
OW	8	61	32.5	32.5	29.5
SG	8	304	55.4	27.2	17.1
SH	8	457	81.2	50.3	18.4
SO	8	374	39.2	38.7	34.0
SZ	8	441	8.6	7.3	6.1
TG	8	365	32.8	22.6	13.3
TI	9	686	70.4	68.2	60.9
UR	8	302	13.9	9.2	6.5
VD	8	765	81.2	79.5	19.3
VS	8	371	52.6	51.8	50.2
ZG	9	59	62.1	59.1	54.8
ZH	8	443	21.0	16.2	6.9
CH		**9057**	**46.3**	**40.8**	**25.9**

BE: A.-M. Maurer. Durchimpfung bei Kleinkindern, nach Schuleintritt und -austritt im Kanton Bern 2001. BAG Bulletin 2003; 26: 445-50.
BE, NE: for all 3 age groups, data were collected via municipals and then directly from the parents.
JU: due to misunderstandings, coverage by doses cannot be determined for schoolchildren.
TI: Data collected by Ufficio del medico cantonale.
Because information on some vaccination cards are incomplete, the sample size may vary by vaccines for some cantons.

Annex G. Distribution of the number of children living in Switzerland who remain unvaccinated, 1999-2003

		Toddlers			School entry			School exit		
KT	Canton	N	n	%	N	n	%	N	n	%
1	AG	321	7	1.9	469	0	0.0	530	0	0
2	AI	185	6	3.5	191	3	1.6	100	0	0
3	AR	270	15	5.0	308	2	0.7	317	1	0.3
4	BE	460	10	2.1	512	5	1.0	492	3	0.7
5	BL	335	13	3.1	412	9	1.8	347	6	1.9
6	BS	291	2	0.5	531	0	0.0	430	0	0
7	FR	281	3	0.9	313	0	0.0	371	0	0
8	GE	702	4	0.7	508	0	0.0	534	5	0.9
9	GL	272	9	2.9	250	1	0.4	250	1	0.4
10	GR	278	10	3.5	258	3	1.1	319	2	0.4
11	JU	237	3	1.3	301	3	1.0	416	6	1.6
12	LU	356	23	6.1	399	4	1.0	254	2	0.7
13	NE	333	1	0.3	371	0	0.0	279	6	2.4
14	NW	296	17	5.5	130	0	0.0	89	0	0
15	OW	240	19	7.7	82	0	0.0	61	0	0
16	SG	278	9	3.1	260	1	0.4	294	0	0
17	SH	364	10	1.8	340	1	0.3	454	5	0.1
18	SO	295	3	0.6	374	0	0.0	374	2	1
19	SZ	377	18	4.5	518	3	0.6	441	0	0
20	TG	235	0	0	334	0	0.0	365	3	0.9
21	TI	679	0	0	787	1	0.1	678	6	0.9
22	UR	289	9	3	248	1	0.4	302	2	0.6
23	VD	382	4	0.9	517	0	0.0	765	2	0.3
24	VS	346	1	0.3	309	0	0.0	321	0	0
25	ZG	255	15	4.8	121	3	2.2	59	0	0
26	ZH	345	8	2.1	538	2	0.4	430	0	0
27	**CH**	**8715**	**219**	**2.0**	**9080**	**39**	**0.4**	**9044**	**48**	**0.5**

"Not vaccinated status" is determined by vaccination card. Because vaccination cards were not collected in canton JU, questionnaires used to confirm vaccination status. Hence, the national average for school children does not include JU.

Annex H.1. Vaccination coverage, with and without imputation for rubella for girls at school departure, 1999-2003

			RUBELLA- 1 dose							
			with imputation				without imputation			
KT	Canton	Kl.	N	n	%	95% CI	N	n	%	95% CI
1	AG	8	532	262	96.6	94.0, 99.1	486	238	96.7	94.0, 99.4
2	AI	6	128	59	91.7	83.7, 99.7	105	46	91.3	80.0, 102.6
3	AR	8	317	164	89.8	85.5, 94.1	126	68	90.6	83.9, 97.3
4	BE	8	492	229	84.7 *	79.5, 90.0	492	229	84.7 *	79.5, 90.0
5	BL	9	347	184	91.2	86.8, 95.6	338	179	91.5	87.2, 95.8
6	BS	9	489	238	94.8	92.0, 97.6	305	157	94.8	91.8, 97.8
7	FR	8	372	177	89.7	84.7, 94.6	367	176	89.6	84.6, 94.6
8	GE	8	534	273	92.3 *	89.4, 95.2	428	220	92.0	88.6, 95.5
9	GL	8 / 9	264	130	97.7	94.9, 100.6	135	65	98.4	94.3, 1.02
10	GR	9	340	184	91.5	86.7, 96.3	289	159	91.5	86.3, 96.6
11	JU	8	416	-	-	-	416	-	-	-
12	LU	9	254	124	95.5	91.4, 99.7	251	122	96.2	92.8, 99.6
13	NE	8	281	143	84.5	77.4, 91.6	269	133	87.1	80.7, 93.6
14	NW	9	89	54	100.0	100.0, 100.0	88	54	100.0	100.0, 100.0
15	OW	8	61	27	88.9	61.4, 116.4	60	26	92.3 *	74.6, 110.0
16	SG	8	303	144	96.0	92.5, 99.5	293	140	95.9	92.3, 99.4
17	SH	8	457	237	88.5	82.9, 94.1	270	143	92.8	86.9, 98.8
18	SO	8	374	187	96.6	93.1, 100.0	373	186	96.5	93.1, 100.0
19	SZ	8	441	206	99.5	98.5, 100.5	229	110	99.1	97.3, 100.9
20	TG	8	365	174	91.6	86.6, 96.6	361	171	91.4	86.4, 96.4
21	TI	9	685	-	-	-	685	-	-	-
22	UR	8	302	148	95.4	90.4, 100.4	250	125	94.6	88.6, 100.6
23	VD	8	765	-	-	-	765	-	-	-
24	VS	8	371	204	92.0	88.3, 95.8	371	204	92.0	88.3, 95.8
25	ZG	9	59	29	100.0	100.0, 100.0	59	29	100.0	100.0, 100.0
26	ZH	8	444	216	93.5 *	90.2, 96.8	444	216	93.5 *	90.2, 96.8
27	**CH**		**7616**	**3793**	**92.6 ***	**91.4, 93.8**	**6389**	**3196**	**92.6 ***	**91.3, 93.9**

CI: confidence interval
* $p < 0.05$: comparison between girls and boys for rubella
JU: no vaccination information; hence not included in total
TI, VD: no information on sex; hence not included in total
without imputation: implies sex is only evaluated through questionnaire
with imputation: implies imputing sex for missing gender

Annex H.1. Vaccination coverage, with and without imputation for rubella for girls at school departure, 1999-2003

			RUBELLA - 2 doses							
			with imputation				without imputation			
KT	Canton	Kl.	N	n	%	95% CI	N	n	%	95% CI
1	AG	8	532	262	78.9	73.1, 84.6	486	238	80.6	74.7, 86.5
2	AI	6	128	59	11.6	-1.8, 25.0	105	46	10.9	-0.3, 22.1
3	AR	8	317	164	**55.3**	**43.2, 67.3**	126	68	**64.2**	**50.7, 77.7**
4	BE	8	492	229	42.7	36.8, 48.5	492	229	34.2	27.5, 40.8
5	BL	9	347	184	39.4 *	31.4, 47.4	338	179	40.0 *	31.8, 48.1
6	BS	9	489	238	**77.2**	**72.3, 82.2**	305	157	**80.3**	**74.9, 85.7**
7	FR	8	372	177	66.1 *	56.1, 76.2	367	176	65.9	55.7, 76.1
8	GE	8	534	273	58.5	52.3, 64.7	428	220	60.5	53.5, 67.5
9	GL	8 / 9	264	130	**76.5**	**65.0, 88.1**	135	65	**83.2**	**70.7, 95.6**
10	GR	9	340	184	44.6	33.3, 55.9	289	159	43.2	32,7, 53.6
11	JU	8	416	-	-	-	416	-	-	-
12	LU	9	254	124	55.7	44.8, 66.7	251	122	55.6	44.7, 66.6
13	NE	8	281	143	36.8	28.6, 45.1	269	133	36.7	27.3, 46.1
14	NW	9	89	54	77.3	62.3, 92.4	88	54	77.3	62.3, 92.4
15	OW	8	61	27	13.8	-12.7,40.3	60	26	15.4	-12.3, 43.1
16	SG	8	303	144	45.9	28.8, 63.0	293	140	45.0	27.9, 62.1
17	SH	8	457	237	**52.8 ***	**42.4, 63.1**	270	143	**57.8 ***	**44.3, 71.4**
18	SO	8	374	187	25.5	18.4, 32.5	373	186	25.6	18.5, 32.6
19	SZ	8	441	206	83.5	77.8, 89.2	229	110	84.6	76.6, 92.6
20	TG	8	365	174	31.8	23.3, 40.3	361	171	31.8	23.4, 40.2
21	TI	9	685	-	-	-	685	-	-	-
22	UR	8	302	148	76.7	68.9, 84.5	250	125	75.6	68.8, 82.5
23	VD	8	765	-	-	-	765	-	-	-
24	VS	8	371	204	31.5	19.3, 43.7	371	204	31.5	19.3, 43.7
25	ZG	9	59	29	68.6	37.1, 100.0	59	29	68.6	37.1, 100.0
26	ZH	8	444	216	36.1	25.8, 46.3	444	216	36.1	25.8, 46.3
27	**CH**		**7616**	**3793**	**49.5 ***	**46.5, 52.4**	**6389**	**3196**	**48.7 ***	**45.6, 51.8**

CI: confidence interval

* $p < 0.05$: comparison between girls and boys for rubella

JU: no vaccination information; hence not included in total

TI, VD: no information on sex; hence not included in total

without imputation: implies sex is only evaluated through questionnaire

with imputation: implies imputing sex for missing gender

Annex H.2 Vaccination coverage, with and without imputation for rubella for boys at school departure, 1999-2003

			RUBELLA- 1 dose							
			with imputation				without imputation			
KT	Canton	Kl.	N	n	%	95% CI	N	n	%	95% CI
1	AG	8	532	270	93.4	90.0, 96.8	486	248	93.2	89.9, 96.5
2	AI	6	128	69	98.7	95.9, 101.5	105	59	98.5	95.3, 101.7
3	AR	8	317	153	94.1	89.8, 98.4	126	58	94.5	88.0, 101.0
4	BE	8	492	263	75.2 *	68.6, 81.8	492	263	75.2 *	68.6, 81.8
5	BL	9	347	163	93.1	87.4, 98.8	338	159	93.0	87.1, 98.8
6	BS	9	489	251	91.5	86.6, 96.4	305	148	91.0	84.2, 97.8
7	FR	8	372	195	86.4	80.3, 92.6	367	191	87.1	81.2, 93.2
8	GE	8	534	261	85.7 *	79.8, 91.7	428	208	88.6	83.3, 94.0
9	GL	8 / 9	264	134	95.5	91.6, 99.4	135	70	98.5	94.9,102.0
10	GR	9	340	156	90.2	84.3, 96.0	289	130	89.0	82.3, 95.7
11	JU	8	416	-	-	-	416	-	-	-
12	LU	9	254	130	95.0	91.4, 98.5	251	129	94.9	91.3, 98.6
13	NE	8	281	138	80.4	74.2, 86.7	269	136	80.8	74.3, 87.3
14	NW	9	89	35	100.0	100.0, 100.0	88	34	100.0	100.0, 100.0
15	OW	8	61	34	84.1	62.4, 105.9	60	34	79.0 *	53.9, 104.0
16	SG	8	303	159	94.7	90.8, 98.6	293	153	94.5	90.4, 98.6
17	SH	8	457	220	85.9	80.3, 91.5	270	127	85.0	78.3, 91.7
18	SO	8	374	187	95.2	91.7, 98.7	373	187	95.2	91.7, 98.7
19	SZ	8	441	235	98.7	97.3, 100.2	229	119	98.3	95.9, 100.8
20	TG	8	365	191	90.1	84.8, 95.4	361	190	90.0	84.7, 95.4
21	TI	9	685	-	-	-	685	-	-	-
22	UR	8	302	154	96.2	93.1, 99.4	250	125	95.4	91.3, 99.4
23	VD	8	765	-	-	-	765	-	-	-
24	VS	8	371	167	86.2	78.9, 93.6	371	167	86.2	78.9, 93.6
25	ZG	9	59	30	85.1	67.0, 103.3	59	30	85.1	67.0, 103.3
26	ZH	8	444	228	86.8 *	81.2, 92.5	444	228	86.8 *	81.2, 92.5
27	**CH**		**7616**	**3823**	**88.3 ***	**86.8. 89.9**	**6389**	**3193**	**88.1 ***	**86.5, 89.8**

CI: confidence interval
* $p < 0.05$: comparison between boys and girls for rubella
JU: no vaccination information; hence not included in total
TI, VD: no information on sex; hence not included in total
without imputation: implies sex is only evaluated through questionnaire
with imputation: implies imputing sex for missing gender

Annex H.2 Vaccination coverage, with and without imputation for rubella for boys at school departure, 1999-2003

			RUBELLA - 2 doses							
			with imputation				without imputation			
KT	Canton	Kl.	N	n	%	95% CI	N	n	%	95% CI
1	AG	8	532	270	69.6	63.5, 75.6	486	248	68.6	61.9, 75.2
2	AI	6	128	69	27.3	-2.2, 56.9	105	59	22.4	-9.2, 54.0
3	AR	8	317	153	**59.0**	**47.9, 70.1**	126	58	**64.9**	**42.3, 81.5**
4	BE	8	492	263	34.2	27.5, 40.8	492	263	34.2	27.5, 40.8
5	BL	9	347	163	26.2 *	19.4, 33.0	338	159	25.6 *	18.9, 32.4
6	BS	9	489	251	**68.8**	**62.6, 75.1**	305	148	**72.3**	**64.8, 79.7**
7	FR	8	372	195	52.9 *	41.0, 64.9	367	191	53.6	41.4, 65.7
8	GE	8	534	261	51.7	43.9, 59.5	428	208	58.3	50.2, 66.5
9	GL	8 / 9	264	134	**76.7**	**66.4, 87.0**	135	70	**87.6**	**79.6, 95.7**
10	GR	9	340	156	46.8	32.2, 61.4	289	130	43.3	26.7, 59.8
11	JU	8	416	-	-	-	416	-	-	-
12	LU	9	254	130	47.1	31.9, 62.4	251	129	47.7	32.9, 62.5
13	NE	8	281	138	33.8	25.2, 42.4	269	136	33.6	24.8, 42.4
14	NW	9	89	35	83.0	72.8, 93.1	88	34	82.5	71.7, 93.2
15	OW	8	61	34	9.8	-4.9, 24.4	60	34	10.5	-4.2, 25.3
16	SG	8	303	159	55.5	40.5, 70.6	293	153	55.1	39.9, 70.2
17	SH	8	457	220	**43.3 ***	**32.0, 56.7**	270	127	**42.9 ***	**28.0, 57.9**
18	SO	8	374	187	23.4	14.0, 32.8	373	187	23.4	14.0, 32.8
19	SZ	8	441	235	81.7	75.4, 88.0	229	119	83.2	77.3, 89.0
20	TG	8	365	191	28.6	19.5, 37.7	361	190	28.8	19.7, 37.8
21	TI	9	685	-	-	-	685	-	-	-
22	UR	8	302	154	79.1	72.4, 86.0	250	125	77.4	69.6, 85.2
23	VD	8	765	-	-	-	765	-	-	-
24	VS	8	371	167	26.5	13.7, 39.3	371	167	26.5	13.7, 39.3
25	ZG	9	59	30	67.6	47.1, 88.1	59	30	67.6	47.1, 88.1
26	ZH	8	444	228	29.8	20.2, 39.4	444	228	29.8	20.2, 39.4
27	**CH**		**7616**	**3823**	**44.5 ***	**41.6. 47.3**	**6389**	**3193**	**43.4 ***	**40.3, 46.4**

CI: confidence interval
* $p < 0.05$: comparison between boys and girls for rubella
JU: no vaccination information; hence not included in total
TI, VD: no information on sex; hence not included in total
without imputation: implies sex is only evaluated through questionnaire
with imputation: implies imputing sex for missing gender

Annex I.1. Distribution of health professionals who are active in vaccinating toddlers between 24-35 months of age in Switzerland as perceived by parents, 1999-2003

			Toddlers							
			General Practitioner		Pediatrician		CAM Practitioner		Others	
KT	Canton	n	n	%	n	%	n	%	n	%
1	AG	321	73	22.1	252	80.0	7	1.7	2	0.4
2	AI	183	158	85.9	27	15.5	1	0.5	0	0
3	AR	268	111	40.3	167	63.8	5	1.8	1	0.3
4	BE	460	77	17.0	362	78.4	8	1.6	2	0.4
5	BL	337	49	14.5	290	86.1	8	2.5	1	0.2
6	BS	287	25	9.5	267	92.9	15	5.2	3	1.2
7	FR	280	42	14.4	246	89.9	5	1.5	3	2.1
8	GE	568	23	4.3	563	95.4	2	0.3	6	1.0
9	GL	268	114	42.5	163	60.8	1	0.3	0	0
10	GR	276	86	34.0	171	59.8	5	1.7	1	0.4
11	JU	234	42	17.9	168	72.0	1	0.4	0	0
12	LU	352	150	41.6	195	56.9	10	3.0	0	0
13	NE	333	33	8.7	307	93.2	4	1.1	2	1.3
14	NW	294	145	47.8	148	52.3	1	0.3	2	0.7
15	OW	236	117	50.4	99	42.3	2	0.1	1	0.7
16	SG	274	78	29.9	203	71.5	6	1.4	0	0
17	SH	363	91	23.1	281	80.3	4	1.1	0	0
18	SO	293	88	27.9	220	76.4	8	2.3	2	1.1
19	SZ	384	102	28.5	280	70.7	7	2.1	0	0
20	TG	234	89	36.6	152	66.6	3	1.3	0	0
21	TI	532	16	3.3	508	95.3	-	-	8	1.5
22	UR	289	91	30.4	197	69.3	1	0.3	3	1.3
23	VD	363	33	9.6	334	91.8	3	0.9	5	1.3
24	VS	352	57	16.1	313	89.1	12	3.5	23	8.8
25	ZG	253	52	20.3	193	78.4	6	2.0	0	0
26	ZH	345	89	25.1	266	73.8	3	0.8	9	4.0
27	**CH**	**8399**	**2031**	**21.5**	**6372**	**79.2**	**128**	**1.6**	**74**	**1.4**

Multiple answers were possible.
TI: Complementary / alternative medicine (CAM) practitioner was not included as a choice.

Annex I.2. Distribution of health professionals who are active in vaccinating children at school entry in Switzerland as perceived by parents, 1999-2003

				School entry									
				General Practitioner		Pediatrician		School health official		CAM Practitioner		Others	
KT	Canton	schoolvax	n	n	%	n	%	n	%	n	%	n	%
1	AG	yes	431	157	35.9	314	73.0	46	10.7	8	1.8	4	0.9
2	AI	no	166	149	89.9	16	9.8	10	5.8	2	1.2	1	0.6
3	AR	yes	218	109	51.4	144	65.0	22	10.4	3	1.1	1	0.5
4	BE	yes	-	-	-	-	-	-	-	-	-	-	-
5	BL	no	407	102	24.7	350	86.6	15	3.4	5	1.3	7	1.6
6	BS	yes	418	86	19.9	343	83.0	25	5.3	8	1.9	6	1.4
7	FR	yes	308	115	39.8	230	70.0	149	48.4	19	6.3	1	1.0
8	GE	no	427	35	8.3	400	93.0	5	1.2	6	1.4	10	2.4
9	GL	yes	212	139	6.6	100	46.9	32	15.0	1	0.5	1	0.5
10	GR	yes	233	94	40.5	181	77.9	17	7.3	3	1.3	0	0.0
11	JU	yes	301	94	31.1	246	80.8	179	59.6	1	0.3	7	2.3
12	LU	no	398	214	53.7	258	64.7	24	6.1	6	1.4	4	1.0
13	NE	yes	372	93	25.7	327	87.8	16	4.4	2	0.5	4	1.4
14	NW	yes	211	82	62.3	65	50.1	64	49.6	0	0.0	3	2.4
15	OW	no	80	52	65.3	36	45.2	6	7.4	0	0.0	0	0.0
16	SG	yes	248	120	48.3	158	63.5	38	15.3	5	2.1	0	0.0
17	SH	yes	335	127	37.6	247	74.2	15	4.6	8	2.4	1	0.3
18	SO	no	374	151	40.8	280	74.2	13	3.3	5	1.3	3	0.9
19	SZ	yes	325	128	39.6	222	68.8	69	21.4	8	2.5	2	0.6
20	TG	yes	344	152	44.3	239	70.5	10	2.5	4	0.9	3	0.8
21	TI	no	-	-	-	-	-	-	-	-	-	-	-
22	UR	no	130	89	43.0	144	67.3	7	3.5	1	0.5	0	0.0
23	VD	yes	-	-	-	-	-	-	-	-	-	-	-
24	VS	yes	299	95	31.6	237	79.1	87	29.1	8	2.7	32	10.8
25	ZG	no	120	84	68.0	73	61.4	8	6.5	2	1.6	0	0.0
26	ZH	yes	530	254	47.4	341	64.1	62	11.9	7	1.3	30	5.8
27	**CH**		**6884**	**2722**	**40.6**	**4951**	**71.3**	**919**	**12.8**	**112**	**1.7**	**120**	**2.4**

Multiple answers were possible.
BE, TI, VD: no information available since questionnaires were not used with school children.
schoolvax: vaccination is permitted in school
CAM: Complementary / alternative medicine

Annex I.3. Distribution of health professionals who are active in vaccinating children at school departure in Switzerland as perceived by parents, 1999-2003

				School departure									
				General Practitioner		Pediatrician		School health official		CAM Practitioner		Others	
KT	Canton	schoolvax	n	n	%	n	%	n	%	n	%	n	%
1	AG	yes	492	232	47.0	311	62.7	359	72.9	8	1.6	6	1.3
2	AI	no	107	94	87.9	15	17.2	18	17.9	0	0.0	0	0
3	AR	yes	127	82	63.3	57	44.7	65	51.9	3	2.6	1	0.9
4	BE	yes	-	-	-	-	-	-	-	-	-	-	-
5	BL	no	341	205	59.6	239	69.9	119	35.1	4	1.3	9	2.5
6	BS	yes	313	93	29.4	230	73.9	173	55.3	8	2.5	10	3.2
7	FR	yes	368	168	45.8	240	64.7	272	73.7	5	1.3	3	0.8
8	GE	no	433	64	14.7	394	90.7	96	22.1	4	0.9	14	3.2
9	GL	yes	136	108	79.3	29	21.7	98	72.6	0	0.0	0	0.0
10	GR	yes	293	174	60.5	207	69.6	58	20.2	1	0.2	2	0.6
11	JU	yes	416	240	57.9	290	69.0	343	82.4	5	1.3	18	4.2
12	LU	no	252	198	77.3	113	45.5	72	28.9	3	1.1	4	1.7
13	NE	yes	276	133	48.0	249	90.1	85	29.9	3	1.0	6	2.2
14	NW	yes	88	69	78.9	38	44.8	59	67.2	1	1.0	1	0.7
15	OW	no	60	43	74.0	38	64.9	8	11.7	0	0.0	1	1.3
16	SG	yes	299	187	62.8	147	50.2	163	54.6	7	2.4	6	1.9
17	SH	yes	285	179	65.8	143	52.4	193	70.3	2	0.8	2	0.6
18	SO	no	374	291	77.7	189	48.5	180	46.4	4	1.0	2	0.5
19	SZ	yes	231	115	49.8	118	51.2	169	73.1	1	0.4	7	3.0
20	TG	yes	364	261	71.5	199	54.1	153	41.7	6	1.8	4	1.2
21	TI	no	-	-	-	-	-	-	-	-	-	-	-
22	UR	no	259	191	74.4	136	52.4	110	42.9	0	0.0	2	0.7
23	VD	yes	-	-	-	-	-	-	-	-	-	-	-
24	VS	yes	321	139	43.1	230	71.2	237	73.5	4	1.3	37	11.2
25	ZG	no	59	53	91.3	28	40.0	11	16.0	3	4.5	2	6.2
26	ZH	yes	430	288	67.1	244	56.8	153	35.5	0	0.0	43	10.0
27	**CH**		**6314**	**3607**	**58.4**	**3884**	**60.4**	**3194**	**47.5**	**72**	**1.1**	**180**	**4.1**

Multiple answers were possible.
BE, TI, VD: no information available since questionnaires were not used with school children.
schoolvax: vaccination is permitted in school
CAM: Complementary / alternative medicine

Annex J.1. Information status regarding vaccination as perceived by parents of toddlers in each canton, 1999-2003

KT	n	received Info (%)	n	If yes..... satisfied (%)	not satisfied (%)	do not know(%)	no answer(%)
AG	321	95.5	308	65.6	26.3	6.8	1.3
AI	183	96.0	176	67.8	19.8	6.9	5.5
AR	268	94.7	255	71.3	17.5	5.3	5.9
BE	460	90.7	422	76.5	14.5	5.1	3.8
BL	337	83.9	287	64.7	22.3	12.4	0.6
BS	287	88.7	260	70.5	20.6	5.3	3.7
FR	280	82.9	240	**61.7**	**27.6**	**4.0**	**6.7**
GE	588	84.0	498	68.9	16.3	8.0	6.8
GL	268	89.0	241	68.8	20.6	4.7	5.9
GR	276	94.1	261	73.5	18.4	4.5	3.6
JU	234	96.6	225	**78.6**	**15.4**	**2.4**	**3.7**
LU	362	90.9	323	63.9	22.7	4.4	9.0
NE	335	89.2	295	65.3	26.7	6.4	1.6
NW	294	**96.7**	285	69.8	22.9	3.3	4.0
OW	236	94.5	223	68.3	21.7	6.2	3.8
SG	274	91.7	251	67.6	20.2	6.8	5.4
SH	363	90.3	333	74.1	15.6	2.9	7.4
SO	293	88.7	266	67.0	18.0	6.8	8.2
SZ	384	89.6	351	68.0	20.4	4.3	7.4
TG	234	93.7	219	63.5	22.0	7.6	7.0
TI	532	89.3	477	67.6	15.6	5.9	10.9
UR	289	94.1	273	71.9	14.7	9.5	3.9
VD	363	**80.0**	288	63.4	25.1	5.8	5.7
VS	352	87.6	312	62.3	37.7	0.0	0.0
ZG	253	92.5	236	68.1	18.2	5.8	8.0
ZH	345	86.6	304	61.7	19.8	0.0	18.4
CH	**8399**	**88.7**	**7609**	**66.9**	**21.2**	**4.8**	**7.1**

Annex J.2. Information status regarding vaccination as perceived by parents of children at school entry in each canton
1999-2003

KT	n	received Info (%)	n	If yes..... satisfied (%)	not satisfied (%)	do not know%)	no answer(%)
AG	431	91.8	397	71.9	16.7	6.8	4.7
AI	166	88.0	147	63.9	13.3	10.9	11.9
AR	218	93.5	202	**75.6**	**14.7**	**9.4**	**0.3**
BE	-	-	-	-	-	-	-
BL	407	88.1	358	68.8	19.5	5.1	6.5
BS	719	83.8	348	69.3	16.6	5.6	8.5
FR	268	89.7	280	69.4	17.2	6.3	7.2
GE	429	**81.0**	349	64.8	18.1	11.5	5.6
GL	213	87.4	186	63.8	19.0	10.1	7.1
GR	233	**95.8**	223	68.3	20.2	10.5	1.0
JU	301	91.5	277	75.0	15.1	9.5	0.3
LU	398	89.8	358	63.7	21.5	13.4	1.4
NE	369	85.8	321	68.8	23.9	3.7	3.6
NW	130	94.5	122	68.1	22.5	8.0	1.4
OW	80	90.2	72	**57.4**	**27.6**	**12.3**	**2.7**
SG	248	92.3	229	68.5	17.8	11.4	2.2
SH	335	89.6	301	62.2	22.0	5.4	10.3
SO	374	89.7	337	66.1	19.7	7.8	6.4
SZ	323	90.7	293	68.3	16.5	13.3	2.0
TG	342	90.9	306	65.3	20.8	7.9	6.0
TI	-	-	-	-	-	-	-
UR	211	93.6	197	69.2	16.2	12.0	2.7
VD	-	-	-	-	-	-	-
VS	291	87.1	255	64.5	10.8	-	24.7
ZG	120	86.5	106	58.6	23.1	9.4	9.0
ZH	530	89.2	475	65.5	14.7	-	19.7
CH	**6876**	**91.8**	**6139**	**67.0**	**17.8**	**6.8**	**8.4**

BE, TI, VD: no information available for schoolchildren as the questionnaire was not used.

Annex J.3. Information status regarding vaccination as perceived by parents of children at school departure in each canton 1999-2003

KT	n	received Info (%)	n	If yes..... satisfied (%)	not satisfied (%)	do not know(%)	no answer(%)
AG	492	92.4	456	73.9	14.5	6.8	4.8
AI	107	89.5	95	68.3	6.2	12.1	13.4
AR	127	92.4	117	71.5	12.4	13.6	2.5
BE	-	-	-	-	-		-
BL	341	90.3	308	68.9	18.3	8.7	4.1
BS	313	84.0	262	69.2	16.8	7.0	6.9
FR	368	91.8	339	71.9	15.2	8.9	4.0
GE	433	85.3	372	68.1	12.1	13.6	6.1
GL	136	82.3	110	69.3	12.8	10.0	7.9
GR	293	87.5	254	66.2	15.7	17.6	0.5
JU	416	91.2	381	68.3	18.8	11.9	1.0
LU	252	89.7	227	**76.6**	**11.6**	**11.4**	**0.4**
NE	276	**93.7**	260	67.8	22.1	8.7	1.3
NW	88	91.0	80	65.7	18.1	15.2	1.1
OW	60	91.5	57	72.3	14.2	10.6	2.8
SG	299	90.6	270	72.1	11.0	15.6	1.3
SH	275	89.6	245	69.5	15.0	8.6	7.0
SO	374	86.6	333	71.9	13.7	8.1	6.3
SZ	231	90.9	210	73.7	12.9	12.4	1.0
TG	364	87.7	322	71.5	13.7	8.1	6.6
TI	-	-	-	-	-	-	-
UR	259	88.1	227	74.3	11.2	13.2	1.3
VD	-	-	-	-	-		-
VS	321	92.3	297	66.6	10.0	-	23.4
ZG	59	84.0	54	**53.6**	**17.3**	**24.0**	**5.1**
ZH	429	**77.7**	333	63.4	17.6	-	18.9
CH	**6313**	**87.2**	**5609**	**69.5**	**14.7**	**8.1**	**7.2**

BE, TI, VD: no information available for schoolchildren as the questionnaire was not used.

Annex K.1. Sources for information regarding vaccination for parents of children between 24-35 months of age in Switzerland, 1999-2003

	AG		AI		AR		BE		BL		BS	
n	321		183		268		460		337		287	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	61.7	78.2	39.3	55.8	47.3	62.6	46.2	64.7	44.7	71.1	38.2	68.1
Doctor upon request	56.2	55.3	54.2	32.2	59.4	50.1	51.8	39.1	60.4	47.1	58.5	48.9
Doctor without request	26.2	65.2	27.4	61.8	29.1	62.7	42.1	65.0	28.3	73.5	38.2	73.4
School doctor	1.2	10.9	1.1	8.9	0.4	8.3	3.0	8.7	0.6	11.3	3.6	15.1
The media	44.2	42.2	42.4	22.1	40.3	38.3	34.9	30.5	46.6	44.8	31.1	34.2
Public health services	27.8	32.4	37.7	36.0	25.0	29.5	28.7	30.8	14.7	24.1	13.5	19.7
Health insurance	1.4	14.6	3.6	16.0	0.6	14.0	2.2	18.0	2.7	19.1	2.6	21.9
Job / Education	13.0	2.0	16.2	3.8	14.0	4.0	11.2	3.3	13.3	6.2	13.0	5.3
Other resources	10.4	5.5	10.4	3.2	8.7	5.3	7.0	2.6	8.0	5.4	8.3	2.8

	FR		GE		GL		GR		JU		LU	
n	280		588		268		276		234		352	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	35.2	64.1	29.7	54.8	49.0	62.1	54.3	58.2	44.7	57.7	49.6	66.5
Doctor upon request	48.5	43.2	41.9	41.5	50.6	37.2	52.8	42.6	46.5	55.5	53.2	39.1
Doctor without request	29.0	62.9	40.0	61.8	27.2	62.8	31.8	60.5	41.8	51.5	25.5	57.3
School doctor	0.6	11.5	2.4	17.1	1.3	11.4	0.7	5.6	3.8	14.3	0.5	10.5
The media	39.1	31.0	26.3	19.6	31.5	28.2	38.9	27.2	20.1	18.6	45.0	38.5
Public health services	11.4	19.9	5.2	12.1	36.0	31.2	32.9	34.1	17.1	24.5	30.4	37.2
Health insurance	3.3	16.2	1.7	11.3	2.9	14.7	1.0	11.4	0.0	49.0	3.0	19.4
Job / Education	15.8	4.7	8.5	2.0	12.5	3.6	12.3	2.4	12.6	2.5	1.3	4.5
Other resources	6.3	3.0	4.8	1.8	7.5	2.6	13.8	5.6	7.8	4.1	10.9	3.4

	NE		NW		OW		SG		SH		SO	
n	333		294		236		274		363		293	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	30.3	69.1	56.2	71.2	58.6	61.8	50.8	64.5	37.7	66.1	45.2	62.1
Doctor upon request	58.6	61.6	58.5	43.2	54.2	40.8	54.0	40.1	61.9	39.4	48.6	36.9
Doctor without request	51.2	72.2	39.8	67.3	26.5	52.9	31.9	57.0	34.2	62.7	39.8	64.9
School doctor	1.1	8.3	0.8	6.9	1.6	7.0	1.8	8.8	2.1	11.0	2.7	14.0
The media	21.6	31.5	42.8	33.3	42.2	30.3	35.7	36.1	39.8	35.4	46.6	30.0
Public health services	10.2	9.1	24.7	32.1	21.8	27.8	28.5	27.2	23.5	26.8	32.0	37.2
Health insurance	1.8	13.5	1.1	17.4	1.1	11.8	3.8	13.7	2.0	17.8	4.1	20.1
Job / Education	12.5	3.6	10.9	3.2	10.7	2.4	11.5	4.0	13.6	2.7	12.2	2.9
Other resources	5.2	2.8	14.0	4.2	14.3	4.0	8.0	5.4	9.0	2.9	8.1	1.7

	SZ		TG		TI		UR		VD		VS	
n	384		234		532		289		363		352	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	41.3	61.0	48.5	64.0	38.3	55.5	59.1	63.1	37.3	59.0	44.6	62.0
Doctor upon request	55.1	40.8	50.8	35.6	56.2	39.6	49.8	38.9	38.6	34.7	46.7	42.4
Doctor without request	29.9	62.1	31.3	65.0	40.9	61.2	38.3	62.4	31.4	62.1	40.4	68.0
School doctor	2.5	11.3	1.4	8.7	-	23.6	1.7	9.9	1.7	13.3	4.0	23.6
The media	43.3	29.0	40.6	29.7	27.6	20.8	40.6	36.3	32.2	25.8	31.5	26.9
Public health services	22.2	29.4	28.4	37.4	8.5	3.4	20.5	25.1	8.7	17.6	17.5	22.5
Health insurance	2.1	19.7	1.3	18.4	1.8	12.9	2.0	19.1	2.7	17.3	1.3	15.4
Job / Education	12.4	5.0	12.4	1.8	11.6	9.6	9.0	2.0	9.3	2.4	2.2	0.0
Other resources	15.7	2.8	9.7	3.0	5.4	0.8	10.2	4.6	6.8	4.4	30.4	22.0

	ZG		ZH	
n	253		345	
	present	future	present	future
Information broshures	55.8	68.5	41.8	61.3
Doctor upon request	54.4	46.6	40.4	35.8
Doctor without request	30.4	64.7	44.8	70.8
School doctor	1.1	9.3	1.5	14.8
The media	44.5	41.6	31.9	30.0
Public health services	22.0	29.1	22.9	35.2
Health insurance	1.6	14.9	2.1	17.2
Job / Education	11.1	3.5	2.1	0.3
Other resources	10.2	8.9	29.6	26.8

Multiple answers were possible.
TI: School doctors were not included as a choice.

Annex K.2. Sources for information regarding vaccination for parents of children at school entry in Switzerland, 1999-2003

	AG		AI		AR		BE		BL		BS	
n	431		183		268		0		337		287	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	52.6	62.1	26.7	39.8	47.6	51.2			39.1	62.8	31.3	57.5
Doctor upon request	45.4	30.6	52.6	31.7	49.8	43.2			53.7	38.5	55.0	40.0
Doctor without request	26.4	50.4	24.9	43.0	38.4	51.6			36.4	62.5	34.3	54.9
School doctor	10.5	23.0	3.5	17.3	5.0	20.0			5.0	16.9	7.4	22.4
The media	38.6	26.4	34.2	15.5	33.5	25.2			41.7	32.1	35.2	29.4
Public health services	27.6	22.5	35.7	27.7	31.3	24.7			13.9	18.7	9.0	12.0
Health insurance	3.3	19.3	1.7	15.9	3.7	14.0			2.4	17.9	2.6	15.6
Job / Education	12.6	4.0	10.8	3.8	13.3	2.7			16.3	5.8	14.3	4.5
Other resources	6.3	2.2	4.1	1.8	8.1	2.9			7.0	3.4	4.8	1.3

	FR		GE		GL		GR		JU		LU	
n	280		588		268		276		234		352	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	35.3	59.6	25.4	47.1	31.0	53.6	44.1	57.4	50.2	53.2	37.3	63.4
Doctor upon request	48.7	46.0	39.8	37.7	42.3	30.1	51.9	40.3	41.1	47.1	53.8	41.4
Doctor without request	36.9	53.2	39.8	50.7	34.4	55.4	37.5	59.0	37.0	43.7	33.5	53.9
School doctor	9.8	23.3	7.1	27.3	11.3	24.9	3.0	16.4	21.7	42.7	6.6	21.1
The media	38.7	26.4	26.5	20.6	32.0	23.1	41.0	31.9	26.9	17.0	44.3	36.8
Public health services	18.5	15.6	7.3	7.6	30.0	18.6	28.8	21.6	20.1	16.6	26.9	28.6
Health insurance	1.3	13.9	2.2	8.3	1.8	16.1	1.3	15.4	0.8	9.1	4.4	20.3
Job / Education	14.8	3.2	11.2	4.7	11.4	3.3	8.0	2.6	10.8	1.6	9.9	2.3
Other resources	3.5	1.5	8.1	2.7	4.8	1.9	4.8	2.6	5.5	2.6	9.3	1.4

	NE		NW		OW		SG		SH		SO	
n	333		130		236		274		363		293	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	30.7	56.3	61.6	65.9	36.3	61.0	39.0	59.9	33.8	61.9	38.4	61.8
Doctor upon request	48.4	53.6	56.6	32.2	56.3	30.9	46.1	28.7	55.5	42.4	55.8	36.3
Doctor without request	48.5	63.8	37.6	58.6	32.4	62.0	30.5	61.2	32.3	60.0	31.4	62.8
School doctor	7.6	16.1	12.9	25.9	9.8	26.7	11.6	27.3	6.9	26.0	6.2	24.0
The media	24.4	27.7	47.5	33.7	42.2	40.3	37.7	26.6	39.1	25.8	36.9	29.3
Public health services	10.4	10.2	28.2	28.7	20.7	24.2	25.5	22.0	21.7	20.2	26.6	25.1
Health insurance	2.5	14.1	2.1	18.2	4.9	26.2	4.0	16.9	3.4	17.3	2.5	20.3
Job / Education	12.1	4.5	13.2	6.1	11.3	3.5	7.7	1.6	14.3	3.5	10.5	3.5
Other resources	6.8	2.5	6.7	4.7	3.6	2.5	7.2	2.0	6.9	2.8	6.5	2.2

	SZ		TG		TI		UR		VD		VS	
n	384		234		0		211		0		291	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	38.2	62.0	47.0	64.5			56.1	65.6			42.7	51.2
Doctor upon request	51.4	31.5	50.3	41.2			47.6	39.7			46.5	49.3
Doctor without request	32.2	56.4	36.1	55.3			41.2	60.9			43.9	58.1
School doctor	8.3	20.7	4.2	23.0			9.0	20.2			21.7	30.9
The media	40.7	27.6	47.6	33.8			55.9	34.7			31.9	21.1
Public health services	24.6	21.1	29.6	25.1			20.0	23.7			20.5	15.9
Health insurance	4.9	18.0	2.0	16.9			3.4	20.2			1.7	13.5
Job / Education	10.2	3.1	13.7	2.9			8.7	3.5			1.6	0.0
Other resources	8.3	4.0	4.9	2.8			4.9	1.8			2.7	18.7

	ZG		ZH	
n	253		530	
	present	future	present	future
Information broshures	41.0	63.4	37.9	59.8
Doctor upon request	49.6	34.7	51.2	42.5
Doctor without request	32.2	60.2	43.0	62.6
School doctor	9.2	15.9	10.1	28.9
The media	48.8	30.0	28.4	27.3
Public health services	35.5	25.7	16.4	18.9
Health insurance	3.1	17.7	1.2	14.8
Job / Education	9.5	3.2	2.1	0.0
Other resources	7.1	3.2	23.4	16.4

Multiple answers were possible.
BE, TI, VD: questionnaires were not used.

Annex K.3. Sources for information regarding vaccination for parents of children at school departure in Switzerland, 1999-2003

	AG		AI		AR		BE		BL		BS	
n	492		107		127		0		341		313	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	51.7	61.3	29.3	36.6	34.1	52.9			43.7	60.2	32.6	60.0
Doctor upon request	39.5	30.7	35.9	25.5	32.4	40.3			48.0	39.3	48.8	37.3
Doctor without request	20.7	38.2	32.0	48.6	29.4	39.2			37.3	56.3	30.8	51.7
School doctor	21.4	29.4	7.1	19.3	37.5	30.9			26.6	32.4	22.4	31.3
The media	34.0	28.6	26.0	11.5	29.0	27.9			36.0	36.1	29.0	26.7
Public health services	25.0	17.5	35.0	15.2	20.3	15.5			17.0	15.6	6.8	11.8
Health insurance	3.8	19.2	8.1	12.4	2.5	17.6			5.1	22.7	4.0	20.4
Job / Education	15.6	5.4	2.6	1.6	9.4	7.7			14.1	9.4	14.2	7.7
Other resources	9.1	2.7	5.5	2.6	8.6	3.9			4.5	1.7	6.6	1.9

	FR		GE		GL		GR		JU		LU	
n	368		433		136		293		416		252	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	44.8	57.8	30.2	49.5	29.9	49.0	32.2	54.7	58.9	56.0	37.1	55.2
Doctor upon request	44.3	40.4	46.5	46.3	32.5	31.5	45.0	37.4	36.5	44.2	44.6	47.7
Doctor without request	25.8	44.6	35.8	47.8	26.5	52.1	36.0	50.0	20.1	32.5	30.5	43.3
School doctor	25.5	28.1	15.0	30.2	32.7	38.4	15.4	21.0	36.5	47.7	32.1	33.6
The media	36.3	25.6	34.0	24.0	26.6	21.5	26.1	23.9	28.3	21.4	31.3	28.6
Public health services	9.0	5.2	5.1	5.2	28.2	20.7	23.9	19.6	15.5	14.0	21.8	19.6
Health insurance	2.7	12.7	1.7	90.3	2.3	16.3	2.5	20.0	4.3	10.6	3.2	20.0
Job / Education	9.6	3.0	10.5	4.2	11.6	6.0	13.2	6.7	8.5	6.4	7.0	6.5
Other resources	6.4	1.4	5.2	2.9	4.3	3.4	6.3	3.4	7.4	4.9	7.0	1.5

	NE		NW		OW		SG		SH		SO	
n	276		88		60		299		275		374	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	35.8	54.6	37.6	59.7	45.4	63.0	33.7	52.8	34.2	56.4	37.7	55.8
Doctor upon request	55.9	58.6	47.3	37.1	42.8	39.5	41.3	36.7	43.8	36.1	41.6	38.5
Doctor without request	34.7	47.8	31.4	52.4	33.8	52.6	26.3	38.5	28.6	41.7	29.9	47.2
School doctor	24.9	32.7	33.1	35.6	13.6	27.3	31.9	32.3	31.6	41.2	21.0	33.6
The media	31.3	34.6	39.6	37.5	48.0	37.7	35.1	27.5	35.3	30.8	37.6	26.0
Public health services	9.2	8.0	28.0	31.5	14.9	16.2	21.5	16.0	22.3	17.0	20.1	14.4
Health insurance	1.6	20.4	6.8	17.9	6.5	30.5	5.5	15.9	3.3	17.4	1.4	18.8
Job / Education	12.8	6.0	12.6	2.2	13.6	13.0	8.0	4.3	12.3	8.1	12.0	6.9
Other resources	5.5	2.9	6.0	0.1	5.9	1.3	6.2	3.1	5.4	1.7	5.3	3.0

	SZ		TG		TI		UR		VD		VS	
n	231		364		0		259		0		321	
	present	future	present	future	present	future	present	future	present	future	present	future
Information broshures	36.0	55.9	39.3	52.7			35.6	55.7			61.0	55.4
Doctor upon request	41.2	33.7	43.2	39.7			43.0	35.1			42.2	54.1
Doctor without request	24.6	42.0	30.6	46.3			29.5	45.0			25.0	42.1
School doctor	35.5	35.5	22.0	28.8			24.1	33.2			35.9	41.3
The media	29.0	22.1	40.6	29.5			34.8	31.5			38.6	31.7
Public health services	22.6	18.7	24.3	19.7			22.8	13.4			20.6	18.1
Health insurance	3.0	16.1	4.7	21.1			3.3	11.9			28.3	13.2
Job / Education	10.0	3.0	11.5	6.6			9.1	7.8			0.5	0.3
Other resources	3.5	2.6	6.1	2.4			6.3	3.1			35.3	24.1

	ZG		ZH	
n	59		429	
	present	future	present	future
Information broshures	36.4	73.9	29.3	54.8
Doctor upon request	34.8	29.2	42.9	42.4
Doctor without request	30.0	52.1	34.9	58.1
School doctor	32.3	29.6	18.2	32.7
The media	33.5	42.1	23.4	24.8
Public health services	27.5	23.2	17.0	13.8
Health insurance	1.5	14.4	1.6	15.8
Job / Education	17.3	13.0	3.5	0
Other resources	5.8	4.4	1.7	19.3

Multiple answers were possible.

BE, TI, VD: questionnaires were not used.

ANNEX L. Percentage of parents of toddlers 24-35 months of age and children at school entry and departure who use alternative medicine, 1999-2003

		Toddlers				School entry				School departure			
KT	Canton	n	Yes	No	No Answer	n	Yes	No	No Answer	n	Yes	No	No Answer
1	AG	321	37.1	57.8	5.1	421	32.5	64.5	3.0	492	26.5	72.0	1.5
2	AI	183	31.9	61.2	7.0	164	34.5	62.4	3.1	107	30.1	69.9	0.0
3	AR	268	46.0	50.0	4.0	218	35.6	59.7	4.6	127	30.7	69.3	0.0
4	BE	460	35.0	59.2	5.8	-	-	-	-	-	-	-	-
5	BL	337	45.6	54.2	0.3	407	33.9	58.9	7.2	343	22.9	69.4	7.8
6	BS	287	37.3	61.1	1.5	376	28.3	61.4	10.3	313	**20.4**	**79.6**	**0.0**
7	FR	280	54.7	39.2	6.1	306	55.3	42.9	1.9	368	43.6	56.4	0.0
8	GE	588	38.5	53.3	8.3	427	42.4	49.7	7.8	433	39.3	56.0	4.7
9	GL	268	33.1	62.3	4.6	209	27.9	70.7	1.3	232	21.9	76.8	1.3
10	GR	276	41.0	57.5	1.5	233	30.8	65.3	3.9	293	29.4	70.6	0.0
11	JU	234	**58.4**	**39.3**	**2.3**	301	**56.6**	**41.1**	**2.2**	416	43.4	53.1	3.5
12	LU	352	40.4	52.4	7.3	393	37.3	60.8	1.9	252	29.0	71.0	0.0
13	NE	333	57.4	41.6	1.0	368	41.9	55.7	2.3	276	**46.5**	**53.5**	**0.0**
14	NW	296	39.3	54.8	5.9	130	46.4	47.0	6.7	88	38.8	61.2	0.0
15	OW	236	56.6	39.6	3.8	80	36.7	55.9	7.5	60	30.5	69.5	0.0
16	SG	274	38.6	59.7	1.8	248	31.2	65.6	3.1	299	29.7	70.3	0.0
17	SH	347	36.4	63.1	4.7	335	32.1	67.0	3.1	275	21.6	78.4	0.0
18	SO	295	34.5	56.1	9.4	374	38.0	53.0	9.0	374	26.0	74.0	0.0
19	SZ	384	36.2	55.2	8.6	323	39.8	59.2	9.4	261	26.0	74.0	0.0
20	TG	234	**28.7**	**68.9**	**2.5**	344	**27.4**	**68.9**	**3.7**	364	21.6	78.4	0.0
22	UR	289	40.3	51.8	7.9	211	42.3	55.2	2.5	259	30.9	69.1	0.0
23	VD	363	55.3	40.8	3.9	-	-	-	-	-	-	-	-
24	VS	352	50.4	49.6	0.0	291	52.7	42.8	4.5	321	40.8	55.1	4.0
25	ZG	253	46.8	50.0	3.3	120	44.3	47.8	7.9	59	21.7	78.3	0.0
26	ZH	345	39.8	60.2	0.0	510	37.8	57.5	4.7	429	30.6	66.4	3.0
21	TI	-	-	-	-	-	-	-	-	-	-	-	-
27	**CH**	**7851**	**41.7**	**54.7**	**3.6**	**6876**	**37.9**	**57.8**	**4.3**	**6313**	**30.9**	**67.4**	**1.7**

BE, TI, VD: not information since questionnaires were not used with the school children.

TI toddlers: this question was not included in the questionnaire.

Annex M.1. School Vaccination Policy

Canton	TIME OF ROUTINE HEALTH WITH/ WITHOUT VAX CARD CHECK-UP			SCHOOL VAX?	TYPE OF VAX CARD	HEPATITIS B CAMPAIGN	CANTONALLY EMPLOYED NURSES	DATA COLLECTION FOR SURVEY	
								SCHOOL YEAR	PRIMARY MODE
AG	1/2 KL	5KL	7/8KL	Y	SBC	Y	Y (LL)	2000-2002	Nurses
AI	1KL	-	6KL	N	SBC	N	N	2000-2001	Doctors
AR	1KL	-	8KL	Y	SBC	Y	N	2001-2002	Doctors
BE	KG	4KL	8KL	Y	SBC	Y	N	2001	Municipal
BL	1KL	4KL	7KL	N	SBC	N	Y (LL)	2000-2001	Nurses
BS	KG	3KL	9KL	Y	SBC	Y	Y (SHS)	2001-2002	Nurses
FR	1KL	5KL	8KL	Y	SBC	Y	N	2000-2001	School authorities
GE	1KL	3KL	8KL	N	SBC	Y	Y (SHS)	2001-2002	Nurses
GL	KG/1KL	5KL	9KL	Y	GL blue booklet	N	N	2000-2001	Doctors
GR	1KL	4KL	9KL	Y	SBC	N	N	2001-2002	Doctors
JU	1KL	5KL	8KL	Y	SBC	N	Y (LL)	2001-2002	Nurses
LU	1KL	4KL	8KL	N	SBC	Y	N	2000-2001	School authorities
NE	1KL	3/4KL	9KL	Y	NE yellow booklet	N	N	2000-2001	Municipal
NW	1KL	-	8KL	Y	SBC	N	Y	2001-2002	School authorities
OW	KG	4KL	9KL	N	SBC	N	N	2001-2002	School authorities
SG	KG	5KL	8KL	Y	SBC	N	N	2001-2002	Doctors
SH	KG	5KL	8KL	Y	SBC	N	N	2000-2001	Doctors
SO	1KL	4KL	8/9KL	N	SBC	N	N	2000-2001	School authorities
SZ	1KL	4KL	8KL	Y	SBC	Y	Y (SHS)	2001-2002	Nurses
TG	KG	4KL	8KL	Y	SBC	Y	N	2000-2001	School authorities
TI	1KL	5KL	8KL	N	SBC	Y	N	2002-2003	Doctors
UR	KG	4KL	8KL	N	SBC	N	N	2001-2002	Doctors
VD	1KL	5KL	8KL	Y	SBC	Y	Y (SHS)	2001-2003	Nurses
VS	1KL	5KL	8KL	Y	VS blue booklet	Y	Y (LL)	1998-1999	Nurses
ZG	KG	4KL	8KL	N	SBC	N	N	2001-2002	School authorities
ZH	KG/1KL	5KL	7/8KL	Y	SBC	Y/N	N	1998-1999	Doctors

Y: Yes. N: No. VAX: Vaccination. KG: Kindergarten. SBC: standard blue card. LL: LungenLiga. SHS: School Health Service with nurses.
Hepatitis B campaign: Hep B information distributed in addition to the standard letter to the parents informing them of the different vaccine-preventable diseases since 1999.
AG: within 2 years all children in these grades are examined. BS: in the 7KL, there is also a big vaccination campaign. BL, GE: the doctors and nurses do not vaccinate, except for Hep B. OW: in KG, a certificate is distributed for a health exam to be redeemed by the family doctor. In 4Kl, there is a health exam in the school. In the 8KL, the "Gemeinde doctor" holds a 2hr health discussion in the class with the students, who receive a certificate for a more personal one on one talk with the doctors.

Annex M.2. Hepatitis B Vaccination Policy

Canton	SCHOOL HEPB CAMPAIGN	YEAR BEGAN	SCHOOL VACCINATION			VACCINATION PERSON	DATA COLLECTION FOR SURVEY			
			YES / NO	GRADE	VACCINE		SCHOOL YEAR	MONTH	GRADE	PRIMARY MODE
AG	YES	99/00	YES	7/8	Engerix / GenHB	LL /SDR	2000-2002	school year	8	Nurses
AI	NO	99	NO	-	-	GP	2000-2001	school year	6	Doctors
AR	YES	99	YES	8	Engerix	SDR	2001-2002	school year	8	Doctors
BE	YES	98/99	YES	8	Engerix / GenHB	SDR	2001	5/01-10/01	8	Municipal
BL	NO	98/99	YES / NO	9	Heprecomb	GP/LL	2000-2001	5/01-7/01	9	Nurses
BS	YES	99/00	YES	7	Engerix / GenHB	SHS	2001-2002	school year	9	Nurses
FR	YES	99/00	YES	7	GenHB	SDR	2000-2001	5/01-7/01	8	School authorities
GE	YES	98/99	YES	7/8	Engerix / GenHB	SHS	2001-2002	school year	8	Nurses
GL	NO	99	YES	9	Engerix / GenHB	SDR/GP	2000-2001	1/01-7/01	8/9	Doctors
GR	NO	99	YES	9	GenHB	GP	2001-2002	school year	9	Doctors
JU	NO	99	YES	8	GenHB	LL	2001-2002	school year	8	Nurses
LU	YES	99	NO	8	-	GP	2000-2001	5/01-7/01	9	School authorities
NE	NO	98/99	NO	-	-	GP	2000-2001	school year	8	Municipal
NW	NO	99	YES	8	Engerix	SHS	2001-2002	2/02-7/02	9	School authorities
OW	NO	99	NO	-	-	GP	2001-2002	2/02-7/02	8	School authorities
SG	NO	99	YES	5-8	Engerix / GenHB	SDR	2001-2002	school year	8	Doctors
SH	NO	98/99	YES	5-8	Engerix / GenHB	SDR	2000-2001	2/01-7/01	8	Doctors
SO	YES	99	NO	-	Engerix	GP	2000-2001	9/00-12/00	8	School authorities
SZ	YES	99	NO	8	-	GP	2001-2002	2/02-7/02	8	Nurses
TG	YES	99	YES	5-8	Engerix	GP	2000-2001	9/00-12/00	8	School authorities
TI	YES	99	NO	-	-	GP	2002-2003	11/02-12/02	9	Doctors
UR	NO	99	NO	7	-	GP	2001-2002	school year	8	Doctors
VD	YES	98/99	YES	7	GenHB	SHS	2001-2003	12/02-8/03	8	Nurses
VS	YES	99	YES	7	Engerix / GenHB	LL	1998-1999	5/99	8	Nurses
ZG	NO	98	NO	-	-	GP	2001-2002	2/02-7/02	9	School authorities
ZH	YES/NO	98/99	YES	7/8	Engerix / GenHB	SDR/GP	1998-1999	2/99-7/99	8	Doctors

LL: Lungenliga. SDR: school doctor. GP: family physician. SHS: School Health Service with nurses.

Hepatitis B campaign: Hep B information distributed in addition to the standard letter to the parents informing them of the different vaccine-preventable diseases since 1999.

AG: within 2 years all children in these grades are examined.

BL: GP vaccinate first, and catch-up shots are done by LL in the 9th grade.

ZH: there is a HepB campaign in the city, but none in the rural areas.

School vaccination policy: applies for period of data collection. In some cantons, it have changed since then.

Durchimpfung in der Schweiz 1999–2003

Obwohl Impfungen als eine der wirksamsten Massnahmen zur Förderung der öffentlichen Gesundheit gelten, hat ein Teil der Bevölkerung diesbezüglich Bedenken. Deshalb wurde das Institut für Sozial- und Präventivmedizin der Universität Zürich beauftragt, die Durchimpfung von Kindern in drei verschiedenen Altersgruppen in allen Kantonen zwischen 1999 und 2003 anhand der Impfausweise zu erheben und die Faktoren, welche das Impfverhalten beeinflussen, mittels Fragebogen zu untersuchen. Die durchschnittliche nationale Durchimpfung mit drei Dosen Diphtherie- (Di), Tetanus- (Te), Pertussis- (Per), Poliomyelitis- (Pol) und Haemophilus influenzae Typ b- (Hib) sowie einer Dosis Masern-, Mumps- und Röteln- (MMR-) Impfung war wie folgt: über 91% bei Di, Te, Per, Pol und Hib und rund 81% bei MMR bei den Kleinkindern, und mit vier Dosen über 92% bei Di, Te und Pol, 60,9% bei Per, 26,6% bei Hib und 87% bei einer Dosis MMR bei Schuleintrittskindern. Bei den Schulaustretenden war die Durchimpfung mit fünf Dosen Di, Te und Pol über 81% und rund 50% bei zwei Dosen MMR (rund 93% bei einer Dosis). Bei dieser Altersgruppe schwankte die Deckung für Hepatitis B zwischen 2,3% und 88,3% mit dem Mittelwert für eine Dosis bei 46,3%, für zwei Dosen bei 40,8% und drei Dosen bei 25,9%. Aufgrund methodischer Schwierigkeiten ist der Vergleich bei Schulkindern zwischen den verschiedenen Kantonen mit Vorsicht zu betrachten. Der Vergleich der Durchimpfung von Kleinkindern mit einer Dosis MMR und je drei Dosen von Di, Te und Pol zwischen den Jahren 1999 und 2003 (diese Studie) und den Jahren 1991 und 1998 zeigt, dass die Durchimpfung ungefähr gleich blieb. Für drei und vier Dosen Per und Hib und vier Dosen Di, Te, und Pol ist die Durchimpfung gestiegen, wobei Hib am offensichtlichsten von 77% im Jahr 1998 auf 91% in unserer Erhebung bei drei Dosen und von 47% auf 79% bei vier Dosen gestiegen ist.

EINLEITUNG

Obwohl Impfungen als eine der effektivsten Gesundheitsmassnahmen gelten, sind die Meinungen darüber teilweise kontrovers. Zahlreiche Eltern und einzelne Ärzte bezweifeln den Nutzen und die Wirkungsweise dieser präventiven Massnahme und heben mögliche Nebeneffekte hervor [1–3]. Um die Bedrohung von Epidemien, die aus mangelnder Impfcompliance resultiert, einschätzen zu können, hat das Bundesamt für Gesundheit (BAG) in den Jahren 1999–2003 eine Erfassung der Durchimpfung in allen 26 Kantonen in Auftrag gegeben. Im Weiteren ging es darum, Methoden für ein regelmässiges Monitoring auszuarbeiten.

Dieser zusammenfassende Bericht vergleicht das Impfniveau bei drei Altersgruppen in den 26 Kantonen. Die Einflussfaktoren, welche das Impfverhalten beeinflussen, werden in einer zweiten Publikation diskutiert. Für mehr Informationen über die Methoden und Analysen siehe detaillierter Bericht vom April 2005 [4].

METHODE

Aufgrund der unterschiedlichen Möglichkeiten eine Stichprobe zu ziehen und der vorhandenen Infrastruktur wurden zwei Methoden benutzt: In 15 Kantonen war eine Liste von Kleinkindern eines bestimmten Jahrgangs von den ausgewählten Gemeinden erhältlich. Diese Liste enthielt Name des Kindes und der Eltern, Geburtsdatum, Geschlecht, Adresse, Nationalität und Telefonnummer. Wegen der relativ kleinen Einwohnerzahl in den Kantonen AI, GL, NW, OW und UR wurden alle Kinder im Alter zwischen 24 und 35 Monaten, die zur Zeit der Studienerhebung in diesen Kantonen wohnhaft waren, befragt. In den Kantonen BS und NE wurde eine einfache Zufallsstichprobe erhoben, da es dort jeweils eine zentrale Datenbank gibt. Weil die Diphtherieimpfung im Kanton GE obligatorisch ist, schreibt der kantonsärztliche Dienst regelmässig allen Eltern, deren Kleinkinder das Alter von 28 Monaten erreicht haben, und fordert diese auf, die Impfausweise einzusenden. Freundlicherweise hat der Kanton Genf dem Institut für Sozial- und Präventivmedizin (ISPM) ermöglicht, diese Studie mit der Routineüberprüfung der Impfausweise zu verbinden, damit die Eltern nicht mehrmals befragt werden mussten. Im Kanton VD wurde die Auswahl der Stichprobengruppe dem «Bureau Vaudois d'Adresses» anvertraut, welches die Verantwortung für den Unterhalt des zentralen Registers des Kantons hat.

Die Familien der ausgewählten Kleinkinder wurden mit einem Brief, welcher ein Erklärungsschreiben,

einen Fragebogen in der Sprache der Region (wenn nötig in der Fremdsprache der Familie) und einen vorfrankierten Briefumschlag enthielt, aufgefordert an der Studie teilzunehmen. Wenn innerhalb von 3–4 Wochen keine Antwort erfolgte, erhielten die Eltern ein Erinnerungsschreiben. Wurde darauf ebenfalls nicht reagiert, kontaktierte man die Eltern telefonisch (ca. 3–4 Versuche zu verschiedenen Tageszeiten).

Als Datenerhebungsgrundlage für die Schulkinder diente überall, ausser in den Kantonen BE und NE, eine Liste der Schulen und der Anzahl der Klassen mit Kindern der Zielgruppe. Von dieser Liste wurden zwischen 30 und 50 Schulklassen, gemäss der durchschnittlichen Klassengrösse des Kantons, ausgewählt. Alle Schüler in den ausgewählten Klassen wurden für die Studie rekrutiert. Nachdem die Klassen ausgewählt waren, variierte die Datenerhebungsmethode entsprechend der vorhandenen Infrastruktur. In den Kantonen FR, LU, NW, OW, SO, TG und ZG wurden Schuldirektoren und Lehrer gebeten, bei der Studie mitzuhelfen. Sie wurden ersucht, Fragebogen zu verteilen und das Original oder eine Kopie des Impfausweises einzusammeln und direkt an das ISPM weiterzuleiten. In den Kantonen AI, AR, GL, GR, SG, SH, TI, UR und ZH wurden die Informationen direkt an die Schulärzte gesandt, welche die Studie mit der routinemässigen Schularztuntersuchung koordinierten. Aufgrund der kleinen Kantonsgrösse von AI, GL und UR wurden die Schulärzte gebeten die Daten von allen Schulanfängern und Schulaustretenden, für die sie zuständig waren, einzusammeln. In den Kantonen AG, BL, BS, GE, JU, SZ, VD wurde die Studie mit den Krankenschwestern des Schulgesundheitsdienstes oder mit der Lungenliga, welche für alle Phasen der Datenerhebung zuständig waren, koordiniert. Da die Studie mit den schulärztlichen Untersuchungen koordiniert wurde, variieren die ausgewählten Stufen: beim Schuleintrittsalter wurden Kindergärtler (zweites Jahr), Erst-, Zweit- oder Drittklässler, und beim Schulaustrittsalter Sechst-, Siebt-, Acht- oder Neuntklässler ausgewählt. In den Kantonen BE und NE wurde die Kleinkinder-Methode auch für die Schulkinder angewendet: Die Familien wurden direkt aufgefordert, an der Studie teilzunehmen, indem, wie bei den Kleinkindern, jede/r Schüler/in der ausgewählten Klasse einen Brief erhielt, welcher ein Erklärungsschreiben und einen Fragebogen enthielt.

In den Kantonen BE, SO, TG und TI wurden alle Phasen der Datenerhebung durch die entsprechenden kantonalen Dienste organisiert und durchgeführt; die Kantone SO und TG sammelten die Daten ein, nachdem die Auswahl vom ISPM durchgeführt wurde. In den Kantonen BE und TI erfolgte die Erhebung unabhängig vom ISPM [5; A. Galfetti, Bellinzona, persönliche Mitteilung, 2003]. Die Daten wurden danach freundlicherweise dem ISPM für die Datenanalyse zur Verfügung gestellt.

Datenanalyse

Die Daten für Kleinkinder und Schulkinder wurden in Abhängigkeit von der Erfassungswahrscheinlichkeit bei der Stichprobe gewichtet und für den Anteil der nicht Antwortenden ausgeglichen. Mit Ausnahme der Kantone BE, TI und VD erfolgte nachträglich eine Stratifikation nach Nationalität (Schweizer/Ausländer) und Geschlecht [4]. Bei Kleinkindern wurde als weiteres Kriterium neben Geschlecht und Nationalität auch die Wohnsituation (Stadt/Land), gemäss Definition des Bundesamtes für Statistik (1999–2003), berücksichtigt. Infolge von Missverständnissen wurde im Kanton JU die Durchimpfung nicht für jede Dosis einer Impfung ermittelt. Das Signifikanzniveau wurde bei $p < 0,05$ festgelegt.

RESULTATE

Beteiligung

Die Studie wurde zwischen 1999 und 2003 für alle drei Altersgruppen in allen Kanton abgeschlossen. Die meisten Kantone leisteten einen Beitrag zur Datenerfassung, vor allem bei den Schulkindern, indem sie finanzielle oder personelle Ressourcen zur Verfügung stellten und administrative Hilfe beim Datenschutz und beim Verfassen der Briefe an die Eltern, Gemeinden und Schulbehörden leisteten.

In 25 Kantonen wurden Kleinkinder zwischen 24 und 35 Monaten ausgewählt. Im Kanton TI wurden die Daten von Kindern im ersten Kindergartenjahr (34–81 Monate, Mittelwert 46,7 Monate) untersucht. Bei den Kleinkindern hatten wir durchschnittlich 62,3% der Impfausweise erhalten. Die Beteiligung bei den Schulkindern variierte in Abhängigkeit von der Art der Datenerhebung (siehe Tabelle 1). In Kantonen, in welchen kantonale Schulkrankenschwestern oder Gesundheitsinstitutionen die Schulärzte bei den Schuluntersuchungen unterstützten, betrug die Beteiligungsrate durchschnittlich 79,2% für Kinder bei Schuleintritt und 77,9% für Kinder bei Schulaustritt. Bei der Zusammenarbeit mit Schulärzten betrug die Antwortrate 56,6% (Schuleintritt) und 63,1% (Schulaustritt). Bei der Zusammenarbeit mit Lehrern lag die Beteiligungsrate bei

Tabelle 1
Durchimpfung in der Schweiz 1999–2003: Rücklauf (%) der Impfausweise nach Art der Datenerhebung und kantonale Spannweite[1)]

	N[2)]	Mittelwert	Spannweite
Kleinkinder	14017	62,3	42,0–82,8
Schuleintritt:	8480	59,8	10,6–96,3
– Schulschwester	3303	79,2	55,2–96,3
– Schulärzte	2423	56,6	40,1–80,6
– Lehrerschaft	1754	37,1	10,6–67,0
Schulaustritt:	7623	57,6	6,8–91,7
– Schulschwester	3489	77,9	57,5–91,7
– Schulärzte	2558	63,1	51,1–79,3
– Lehrerschaft	1576	33,4	6,8–58,9

[1)] Ohne BE, JU, NE, TI
[2)] N: Stichprobengrösse

37,1% (Schuleintritt) und 33,4% (Schulaustritt). In NE, wo die Familien der ausgewählten Schüler ohne Hilfe von Schulärzten oder offiziellen Stellen direkt kontaktiert wurden, lag der Beteiligungsgrad bei 69,6% für Schuleintrittskinder und 63,5% für Kinder bei Schulaustritt. In BE war die Beteiligung nach maximal 4 Kontakten per Brief mit 89,5% (Schuleintritt) und 90,6% (Schulaustritt) sehr hoch [5]. Dank der Hilfe von Schulärzten war im Kanton TI die Antwortrate mit 84,2% resp. 83,7% ebenfalls sehr hoch [A. Galfetti, Bellinzona, persönliche Mitteilung, 2003].

Durchimpfung

Tabelle 2 zeigt eine Zusammenfassung der nationalen Durchimpfung, detailliert nach Anzahl Impfungen und Altersgruppe. Die Durchimpfung mit den ersten drei Dosen Di, Te und Pol bei allen drei Altersgruppen sowie Per und Hib bei den Kleinkindern ist hoch (>90%). Für die weiteren Dosen fällt das Impfniveau, z.B. bei Kleinkindern, bis auf 83,6% für vier Dosen Di, auf 60,0% für fünf Dosen Di bei Kindern im Schuleintrittsalter und auf 51,4% für sechs Dosen bei Jugendlichen. Die Impfdichte für eine Masern-, Mumps- und Rötelnimpfung ist 82,3%, 81,1% und 80,8% bei Kleinkindern und steigt auf 88,4%, 87,0% und 86,6% bei Kindern bei Schuleintritt und 93,8%, 93,1% und 90,6% bei Schulabgängern. Mit zwei Dosen MMR waren nur noch ca. 50% geimpft. Die Rötelndurchimpfung war höher bei Mädchen als bei Knaben (92,5% vs. 88,3% mit einer Dosis und 49,5% vs. 44,5% mit zwei Dosen, $p<0,05$). Bei Schulaustritt zeigte die HepB-Durchimpfung eine grosse Spannweite von 7,5% bis 88,3% (Mittelwert 46,3%) für eine Dosis, 6,7% bis 82,0% (Mittelwert 40,8%) für zwei Dosen und 2,3% bis 68,3% (Mittelwert 25,9%) für drei Dosen. Die Anzahl der Kinder, welche nicht geimpft wurden, ist klein und betrifft eher Kleinkinder als Schulkinder. Die MMR- und HepB-Impfungen wurden öfters weggelassen als andere Impfungen.

Tabelle 3 erlaubt einen detaillierteren Vergleich der Durchimpfung von Kleinkindern mit drei und vier Dosen von Di, Te, Per, Pol, Hib sowie mit einer Dosis MMR zwischen den einzelnen Kantonen. Bei drei Dosen von Di, Te, Per, Pol und Hib hat OW die tiefste Impfdichte von allen Kantonen, für vier Dosen (ausser Pol) hat Kanton AI die niedrigste Impfdichte. Für Masern und Mumps hat der Kanton AR die tiefste Durchimpfung. Für Röteln ist der Kanton SH am tiefsten mit 51,3%. Der Kanton TI hat, möglicherweise wegen des höheren Alters der erfassten Kinder (durchschnittlich 46,7 Monate), die höchsten Raten für alle Impfungen.

Im Weiteren zeigt Tabelle 3 einen nationalen Vergleich der Durchimpfung von Kleinkindern zwischen den Jahren 1991, 1998 und 1999–2003. Die erfassten Impfdichten für eine Dosis MMR und drei Dosen Di, Te und Pol waren vergleichbar zwischen der vorliegenden Studie (1999–2003) und früheren Studien (1998 und 1991); für drei und vier Dosen Per und Hib und vier Dosen Di, Te, und Pol, hat sich die Durchimpfung erhöht, mit einer markanten Zunahme bei Hib, welche mit drei Dosen von 77% im Jahre 1998 auf 91% in unserer Erhebung und mit vier Dosen von 47% auf 79% gestiegen ist.

DISKUSSION

Die zur Herdenimmunität nötige Durchimpfung (Immunität) liegt bei 80–85% für Di und Pol, 92–95% für Per und Masern, 90–92% für Mumps und 85–87% für Röteln [6]. Diese Erhebung zeigt, dass die Durchimpfung bei Kindern in der Schweiz deutlich unter dem vom BAG und der WHO empfohlenen Niveau liegt [7]. Die für eine Herdenimmunität erforderliche Durchimpfung wird zwar für Di und Pol erreicht, für Masern, Mumps und Röteln liegt sie hingegen um 11, 10 resp. 5 Prozentpunkte darunter. Die Impfrate ist bezüglich den empfohlenen zwei Dosen MMR sowie den fünf oder sechs empfohlenen Dosen von Di und Te bei Schuleintrittskindern respektive Schulabgängern ebenfalls deutlich reduziert. Diese tiefe Durchimpfung zeigt, dass mehr Massnahmen erforderlich sind, um das von der WHO festgelegte Ziel eines optimalen Impfschutzes zu erreichen, Immunität zu gewährleisten und unkontrollierte Virusverbreitungen zu verhindern.

Verglichen mit den Jahren 1991 und 1998 ist die Durchimpfung für Per und Hib gestiegen. Dies ist der Tatsache zu verdanken, dass immer öfters kombinierte Impfungen angewendet werden. Die bessere Aufklärung über die Gefahren von Hib ist ein weiterer möglicher Grund für die gestiegene Rate der Hib-Impfung, welche erst seit 1991 im Impfplan empfohlen ist. Seit 1987 wird die MMR-Impfung teilweise kontrovers diskutiert, weshalb die Impfdichte auf tiefen 80% bleibt.

Der Einfluss von kombinierten Impfungen wird auch durch die sehr ähnlichen Durchimpfungswerte mit Di, Te, Pol und auch MMR, sowie Hib und Per bei Kleinkindern, belegt. Eine bemerkenswerte Ausnahme zeigt sich im Kanton SH, wo die Durchimpfung für Röteln bei Kleinkindern viel tiefer ist als jene für Masern und Mumps. Diskussionen mit dem Kantonsarzt zeigten, dass Kinderärzte in diesem relativ kleinen Kanton die Rötelnimpfung bei Kleinkindern nicht empfehlen, weshalb die Impfung dann erst im Kindergartenalter nachgeholt wird.

Die Kantone GE und TI haben die höchste Durchimpfung bei den meisten Impfungen. Dies ist wahrscheinlich darauf zurückzuführen, dass in diesen Kantonen die Di-Impfung obligatorisch ist und somit eine hohe Durchimpfung auch für Te, Per, Hib und Pol nach sich zieht, da immer öfters kombinierte Impfungen gebraucht werden. Obwohl nur die Di-Impfung obligatorisch ist, meinen viele Eltern, dies sei auch bei der MMR-Impfung der Fall, was sie oft veranlasst, ihre Kinder auch gegen MMR impfen zu lassen. Weil obligatorische Impfungen nur in einigen französischsprachigen Kantonen (GE, FR, NE) und im TI existieren, variiert der Impfgrad regional sehr stark. Kleinkinder in italienisch- und französischsprachigen Regionen sind deutlich besser geimpft als ihre Altersgenossen in der Deutschschweiz. Dieses Phänomen muss jedoch im Kanton TI mit Vorsicht interpretiert werden, da in diesem Kanton die Kinder erst im ersten Kindergartenjahr erfasst wurden und nicht wie in den übrigen Kantonen im Alter von 24–35 Monaten.

Tabelle 2
Durchimpfung (%) bei Kleinkindern und Schulkindern in der Schweiz 1999–2003 nach Anzahl Dosen (kantonale Spannweite)

a) Kleinkinder (24–35 Monate; n=8729)

Impfung	Anzahl Dosen						
	0	**≥1**	**≥2**	**≥3**	**≥4**	**≥5**	**≥6**
Diphtherie	**2,8**	**97,2**	**96,6**	**95,4**	**83,6**		
	0–9,3	90,7–100,0	89,5–99,2	88,7–98,5	66,8–92,4		
Tetanus	**2,1**	**97,9**	**97,3**	**95,9**	**83,7**		
	0–7,8	92,2–100,0	91,1–99,5	89,9–98,5	67,2–92,4		
Pertussis	**5,3**	**94,7**	**94,1**	**92,9**	**81,3**		
	0,7–13,2	86,8–99,3	86,4–98,2	86,0–97,8	63,7–92,0		
Poliomyelitis	**2,8**	**97,2**	**96,6**	**95,3**	**82,7**		
	0,3–8,9	91,1–99,7	90,3–99,5	89,1–97,8	61,1–90,8		
H. influenzae	**5,9**	**94,1**	**92,8**	**91,1**	**79,3**		
	1,1–12,4	87,6–98,9	87,6–97,0	86,0–96,0	60,8–87,1		
Masern	**17,7**	**82,3**	**7,8**				
	6,3–31,4	68,6–93,7	0–48,2				
Mumps	**18,9**	**81,1**	**7,7**				
	6,7–33,2	66,8–93,3	0–47,8				
Röteln	**19,2**	**80,8**	**7,7**				
	6,7–48,7	51,3–93,3	0–47,8				

b) Schuleintritt (Kindergarten, 1.–3. Klasse; n=8660)

Impfung	Anzahl Dosen						
	0	**≥1**	**≥2**	**≥3**	**≥4**	**≥5**	**≥6**
Diphtherie	**0,9**	**99,1**	**98,0**	**97,1**	**92,5**	**60,0**	
	0–2,9	97,1–100,0	95,8–100,0	94,1–98,8	83,2–95,6	14,6–80,9	
Tetanus	**0,6**	**99,4**	**98,3**	**97,3**	**92,7**	**60,2**	
	0–2,2	97,8–100,0	98,8–100,0	94,1–98,8	85,6–98,9	14,6–80,9	
Pertussis	**6,6**	**93,4**	**91,0**	**88,9**	**60,9**	**19,4**	
	1,1–15,7	84,3–98,9	69,9–97,7	64,0–96,8	32,1–92,8	1,2–51,5	
Poliomyelitis	**0,9**	**99,1**	**98,0**	**97,0**	**92,0**	**59,6**	
	0–2,4	97,6–100,0	96,0–100,0	93,5–98,8	73,6–95,9	9,2–78,8	
H. influenzae	**9,9**	**90,1**	**86,6**	**78,3**	**26,6**		
	3,3–15,6	84,4–96,7	79,5–96,6	67,5–91,3	3,0–80,1		
Masern	**11,6**	**88,4**	**36,6**				
	6,2–19,3	80,7–93,8	3,5–69,6				
Mumps	**13,0**	**87,0**	**36,0**				
	6,3–23,6	76,4–93,7	3,0–69,4				
Röteln	**13,4**	**86,6**	**35,9**				
	6,3–38,1	61,9–93,7	3,0–69,6				

c) Schulaustritt (6.–9. Klasse; n=8277)

Impfung	Anzahl Dosen						
	0	**≥1**	**≥2**	**≥3**	**≥4**	**≥5**	**≥6**
Diphtherie	**1,1**	**98,9**	**95,5**	**93,1**	**90,2**	**81,6**	**51,4**
	0–5,1	94,9–100,0	87,7–99,2	86,3–99,2	81,6–95,9	56,3–94,0	15,8–78,7
Tetanus	**1,0**	**99,0**	**95,7**	**93,3**	**90,5**	**82,2**	**52,1**
	0–5,1	94,9–100,0	87,9–100,0	86,7–99,2	82,8–96,2	58,9–94,0	17,3–78,8
Pertussis	**12,5**	**87,5**	**86,0**	**83,5**	**12,9**	**3,4**	
	2,1–55,8	44,2–97,9	42,4–96,2	41,1–95,0	0,7–28,7	0,0–22,5	
Poliomyelitis	**1,1**	**98,9**	**95,7**	**93,0**	**90,0**	**80,7**	
	0–6,8	93,2–100,0	89,2–100,0	86,0–98,4	84,1–96,2	64,0–91,7	
Masern	**6,2**	**93,8**	**54,0**				
	0,9–16,0	84,0–99,1	13,5–82,6				
Mumps	**6,9**	**93,1**	**52,7**				
	0,9–18,2	81,8–99,1	12,3–82,6				
Röteln	**9,4**	**90,6**	**49,8**				
	0–20,5	79,5–100,0	12,3–82,6				
Hepatitis B	**53,7**	**46,3**	**40,8**	**25,9**			
	11,7–92,5	7,5–88,3	6,7–82,0	2,3–68,3			

JU: ohne Schulkinder. BE: Per ≥4 Dosen und MMR ≥2 Dosen wurden nicht erfasst [5]. TI: Daten erfasst vom Kantonsärtzlichen Dienst. Statt bei Kindern im Alter 24–35 Monate erfolgte die Erhebung bei Kindern im 1. Kindergartenjahr.

Tabelle 3
Durchimpfung der Kleinkinder (24–35 Monate) in der Schweiz nach Kantonen, 1999–2003

Kanton	Jahr	N	Di3	Di4	Te3	Te4	Per3	Per4	Pol3	Pol4	Hib3	Hib4	Ma1	Mu1	Rö1
AG	2000	321	95,0	83,1	95,5	82,9	91,9	81,0	96,6	83,5	89,9	80,7	82,5	79,7	78,4
AI	2000	270	90,9	**66,8**	92,4	**67,2**	89,8	**63,7**	92,4	70,7	87,3	**60,8**	71,3	71,3	71,3
AR	2002	185	91,1	78,7	91,1	78,7	88,7	77,6	90,8	77,8	88,5	76,2	**68,6**	**66,8**	66,8
BE	2001	291	95,2	84,2	95,4	84,8	92,8	82,4	94,6	86,1	90,7	80,0	77,6	77,6	77,6
BL	2000	460	95,4	78,2	96,4	78,2	89,8	75,1	94,6	75,3	86,3	68,3	75,6	73,7	73,6
BS	2000	337	94,7	78,7	95,0	79,3	90,4	76,8	94,6	77,3	87,8	71,8	78,5	74,3	74,1
FR	2001	281	**98,2**	83,5	98,2	83,5	95,9	82,9	97,6	81,9	92,5	83,6	86,0	84,6	84,6
GE	2002	702	97,9	89,8	98,2	89,5	**96,9**	**89,2**	96,7	**89,5**	93,8	**86,2**	92,7	90,3	90,4
GL	2001	272	95,1	86,2	95,8	86,6	94,8	86,2	95,5	84,9	93,8	81,1	77,9	77,6	77,6
GR	2002	278	94,7	82,5	95,0	82,5	92,4	81,9	93,4	82,2	91,0	82,0	78,7	76,6	76,1
JU	2002	237	95,8	**90,4**	95,8	**90,0**	94,5	89,1	95,0	88,1	92,5	85,7	83,5	83,3	83,3
LU	2001	356	90,4	76,2	90,6	76,7	86,2	72,8	90,6	75,3	86,1	73,9	71,4	69,6	68,8
NE	2000	335	96,7	87,9	97,9	87,7	94,9	85,9	96,7	86,8	90,8	75,5	89,4	89,0	89,4
NW	2001	296	92,2	82,2	92,2	82,2	90,3	79,6	91,9	80,2	88,7	74,8	80,2	75,6	76,2
OW	2002	240	**88,7**	78,8	**89,9**	79,1	**86,0**	76,8	**89,1**	78,0	**86,0**	76,4	73,7	73,3	73,3
SG	2002	387	93,6	83,8	93,8	84,3	91,9	82,6	93,7	83,8	89,7	79,2	76,1	75,8	75,8
SH	2001	278	95,4	79,0	96,3	79,0	93,1	64,5	94,3	**61,1**	91,1	78,6	75,0	69,2	**51,3**
SO	2000	295	97,1	82,4	97,5	82,4	94,9	80,2	96,8	80,1	93,5	76,1	81,0	79,9	79,9
SZ	2001	365	93,0	79,4	93,4	79,8	90,8	77,9	93,0	78,9	91,3	77,3	80,0	79,1	79,3
TG	2000	235	95,7	84,1	95,7	84,1	92,9	80,5	95,8	79,1	90,9	77,8	84,1	82,2	81,7
TI[1)]	2002	684	98,5	92,4	98,5	92,4	97,8	92,0	97,8	90,8	96,0	87,1	93,7	93,3	93,3
UR	2001	289	96,4	87,1	96,4	87,1	93,4	84,8	96,4	85,2	91,4	84,8	83,2	81,5	81,8
VD	2003	353	97,8	84,9	**98,5**	84,9	95,5	84,3	96,9	82,7	**94,4**	81,1	89,7	88,7	88,7
VS	1999	382	96,2	88,2	98,1	88,9	95,6	82,7	**97,8**	87,0	93,6	78,7	**92,9**	**92,6**	**92,6**
ZG	2002	255	92,9	82,2	93,2	82,2	91,0	81,7	91,6	81,2	90,5	79,8	77,1	77,1	76,9
ZH	1999	345	95,1	82,7	95,6	82,7	91,9	78,6	95,3	82,0	91,1	78,8	81,4	81,1	81,1
CH	**1999–2003**	**8729**	**95,4**	**83,6**	**95,9**	**83,7**	**92,9**	**81,3**	**95,3**	**82,7**	**91,1**	**79,3**	**82,3**	**81,1**	**80,8**
CH	**1998[2)]**	**403**	**94,3**	**71,7**	**93,3**	**71,5**	**88,1**	**68,2**	**92,1**	**76,2**	**76,9**	**47,4**	**81,4**	**78,9**	**78,7**
CH	**1991[3)]**	**401**	**95,0**	**71,1**	**93,3**	**70,9**	**88,8**	**–**	**94,8**	**70,4**	**–**	**–**	**83,1**	**80,1**	**79,6**

Di3: Diphtherie (3 Dosen), Te: Tetanus, Per: Pertussis, Pol: Poliomyelitis, Hib: Haemophilus influenzae Typ b, Ma: Masern, Mu: Mumps, Rö: Röteln.
[1)]1. Jahr Kindergarten; [2)][8]; [3)][9]

Die relativ hohe Nichtbeantwortungsrate bei den Kleinkindern und Schulkindern schränkt die Aussagekraft der Ergebnisse ein. Da anzunehmen ist, dass Eltern, welche Impfungen ablehnen, weniger bereit sind, an Impfstudien teilzunehmen, kann es zur Überschätzung der effektiven Durchimpfung kommen. Dieser Einfluss wurde jedoch teilweise bei der Auswertung berücksichtigt. Eine weitere Optimierung der Datenqualität könnte durch differenziertere Statistikmodelle sowie eine erhöhte Antwortrate erlangt werden.

Die Datenerfassung bei den Schulkindern ist so unterschiedlich, dass ein Vergleich zwischen den Kantonen und den Altersgruppen innerhalb der Kantone schwierig ist. Aufgrund unterschiedlicher Organisationsstrukturen in den Schulgesundheitsdiensten war das Vorgehen bei der Datenerhebung sehr unterschiedlich. Ebenfalls trugen die grossen Spannweiten im Alter der untersuchten Schüler bei den Gesundheitsuntersuchungen und die unterschiedlichen Impfleitlinien dazu bei, dass Unterschiede bei den Impfraten zwischen den Kantonen schwer interpretierbar sind. Weitere Faktoren, welche die Vergleichbarkeit zwischen den Kantonen beeinträchtigen, sind: der Zeitpunkt der Routineuntersuchungen, welche Impfungen werden in der Schule angeboten, dürfen Schulärzte Impfungen selbst durchführen, wurde eine HepB-Kampagne in der Schule durchgeführt? Die Durchimpfung wurde aber hauptsächlich durch die Beteiligungsrate und die Art der Datenerhebung beeinflusst, wovon Letztere den grösseren Einfluss hatte. Zusätzlich ist häufig unklar, ob die Datener-

hebung und die Schulimpfungen gleichzeitig stattfanden, was wiederum zu ungenauen Schätzungen führen kann. Nachimpfungen, die durch Hausärzte durchgeführt wurden, konnten ebenfalls nicht berücksichtigt werden. Zusätzlich erschwerten (durch Ärzte und Krankenschwestern) unvollständig ausgefüllte Impfformulare einen Vergleich innerhalb der einzelnen Kantone. Die Gründe für die Nichtbeantwortung bei den Schulen sind nicht bekannt.

Aufgrund dieser Einschränkungen und um die Vergleichbarkeit zwischen den Kantonen, im Speziellen bei Schulkindern, zu verbessern, wurde die Methode geändert. Es wird empfohlen, dass die Methode zur Erfassung der Daten der Kleinkinder auch bei den Schulkindern angewendet wird. Eine Zusammenarbeit mit kantonalen Schulgesundheitsdiensten ist nur sinnvoll, wenn diese sehr gut etabliert sind und von kantonalen Schulkrankenschwestern unterstützt werden. Des Weiteren wird ein Elternbrief durch den kantonsärztlichen Dienst empfohlen, um die Rückantwortrate weiter zu erhöhen. Das Überwachungssystem wird von 2004–2007 jeweils in neun Kantonen pro Jahr eingeführt und wird unterstützt durch die Schweizerische Konferenz der kantonalen Gesundheitsdirektorinnen und -direktoren. Im Jahre 2005 wurden in folgenden Kantonen die Daten erhoben: AI, AG, BL, BS, SH, SO, SZ und ZH. Der Kanton BE hat die Studie bereits 2004 selbstständig durchgeführt. Es wird erwartet, dass die 17 weiteren Kantone in den Jahren 2006/2007 teilnehmen werden.

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Dank: Wir bedanken uns bei allen kantonsärztlichen Diensten, den Schulärzten, Schulärztinnen, Schulschwestern und allen weiteren Personen, die uns bezüglich unserer Impfstudie unterstützten. Ein besonderer Dank für die Erlaubnis, von den Kantonen bereits erhobene Daten zu verwenden, geht an Frau Anne-Marie Maurer vom Kantonsarztamt der Gesundheits- und Fürsorgedirektion des Kantons Bern, an Frau Alessandra Galfetti vom Ufficio del medico cantonale in Bellinzona und Herrn Philippe Sudre vom Office du médecin cantonal Genève. ■

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Durchimpfung in der Schweiz 2005

Zwischen 1999 und 2003 wurde die Durchimpfung bei in der Schweiz wohnhaften Kindern auf nationaler und kantonaler Ebene ermittelt und die Grundlagen für ein regelmässiges Monitoring erarbeitet [1]. Bis 2007 soll die nationale Durchimpfung zum zweiten Mal umfassend erhoben werden, um Veränderungen erfassen zu können. In den Jahren 2004 und 2005 wiederholten neun Kantone (AI, AG, BL, BS, NE, SH, SO, SZ, ZH) die Erhebung für drei verschiedene Altersgruppen: Kleinkinder im Alter von 24 bis 35 Monaten sowie 8 und 16 Jahre alte Kinder. Die Daten für diese neun Kantone lassen auf folgende durchschnittliche nationale Durchimpfung bei Kleinkindern schliessen: Mit drei Dosen Diphtherie (Di), Tetanus (Te), Pertussis (Per), Poliomyelitis (Pol) und Haemophilus influenzae Typ B (Hib) 95,6%, 95,9%, 93,8%, 94,4% und 93,0% sowie mit einer Dosis Masern (Ma), Mumps (Mu) und Röteln (Ro) 86,2%, 84,9% und 84,9%. Ein Vergleich mit den Ergebnissen der Erhebung 1999–2003 zeigt, dass die Durchimpfung gegen Di, Te und Pol auf nationaler Ebene unverändert geblieben ist, hingegen die Impfrate gegen MMR mit einer und zwei Dosen und gegen Hib und Per mit vier Dosen signifikant angestiegen ist. Mögliche Erklärungen für diese Zunahmen sind die Applikation kombinierter Impfstoffe, der Wechsel vom zellulären zum azellulären Per-Impfstoff sowie mehrere Masernausbrüche seit 2003. Von den neun Kantonen verzeichneten acht einen generellen Anstieg der Durchimpfung, währenddem im Kanton Schwyz ein deutlicher Rückgang zu registrieren war.
In acht Kantonen betrug die Durchimpfung mit vier Dosen Di, Te, Per, Pol und Hib bei den 8-Jährigen 95,1%, 95,4%, 87,3%, 94,1% und 89,2% und mit einer Dosis MMR 89,5%, 88,2% und 88,0%. Bei den 16-Jährigen lag das Impfniveau mit fünf Dosen Di, Te und Pol bei 85,9%, 86,2% und 91,7% und mit zwei Dosen MMR bei 75,0%, 73,1% und 72,6%. Die Impfquote von Schulkindern ist bei allen Impfungen stark angestiegen. Der Grund hierfür könnte jedoch in erster Linie das höhere Alter der für diese Studie erfassten Kinder sein. Auch die Durchimpfung gegen Hepatitis B hat deutlich zugenommen: auf 65,3% mit einer Dosis, 60,8% mit zwei Dosen und 36,8% mit drei Dosen.

EINLEITUNG

Die Durchimpfung bei in der Schweiz wohnhaften Kindern wurde von 1999 bis 2003 auf nationaler und kantonaler Ebene erhoben [1]. Mit der Unterstützung der Schweizerischen Konferenz der kantonalen Gesundheitsdirektorinnen und -direktoren sollen diese Erhebungen in Zukunft regelmässig alle drei Jahre in allen Kantonen durchgeführt werden. Gegenwärtig erfolgt die Datenerhebung für die Periode 2005–07. Dieser Bericht informiert über den erreichten Impfgrad in neun Kantonen (AI, AG, BL, BS, NE, SH, SO, SZ, ZH), die 2005 an der nationalen Erhebung teilgenommen haben. Der Kanton BE hat die Daten bereits 2004 selbstständig erhoben und wird sie dem ISPM Zürich zu einem späteren Zeitpunkt zur Verfügung stellen. In den übrigen Kantonen erfolgt die Datenerhebung 2006–07.

METHODE

Wiederum wurden drei verschiedene Altersgruppen untersucht: Kleinkinder im Alter zwischen 24 und 35 Monaten sowie 8-jährige und 16-jährige Kinder. Im Kanton BS wurden 2005 nur Daten von Kleinkindern erhoben. Für alle drei Altersgruppen wurde dieselbe Methode benutzt.

Je nach vorhandener Datenerhebungsgrundlage wurde ein unterschiedliches Vorgehen angewandt. In den Kantonen AG, BL, SO und ZH, wo von jeder Gemeinde eine Liste mit allen im Jahre 2002 geborenen Kindern erhältlich war, wurde die Clusterstichprobe verwendet. Zuerst wurden die Gemeinden und danach die Kinder ausgewählt. Da in den Kantonen AI, BS und NE ein zentrales Register existiert, wurden die Kinder hier nach dem Zufallsprinzip ausgewählt. Die Gemeinden der restlichen beiden Kantone (SH und SZ) wurden angefragt, eine Liste mit allen Einwohnern der betreffenden Altersgruppen zu liefern und die Kinder dann ebenfalls nach dem Zufallsprinzip ausgewählt.

Die von den Gemeinden oder den zentralen Registern erhobenen Informationen beinhalteten den Namen des Kindes und der Eltern, das Geburtsdatum, das Geschlecht, die

Adresse, die Nationalität und, nach Möglichkeit, den Beruf der Eltern und die Telefonnummer.

Alle Familien der ausgewählten Kinder wurden mit einem Brief, der ein Erklärungsschreiben und einen vorfrankierten Briefumschlag enthielt, aufgefordert an der Studie teilzunehmen und eine Kopie oder den Originalimpfausweis einzusenden. Vier bis fünf Wochen später erhielten die Eltern, die noch nicht geantwortet hatten, ein Erinnerungsschreiben. Wurde darauf ebenfalls nicht reagiert, erfolgte eine telefonische Kontaktaufnahme (fünf bis sechs Versuche zu verschiedenen Tageszeiten an verschiedenen Wochentagen).

Datenanalyse

Die Stichproben wurden zuerst gewichtet, für den Anteil der nicht Antwortenden ausgeglichen und nach Nationalität, Geschlecht und Wohnsituation (Stadt/Land) stratifiziert. Die Wohnsituation wurde gemäss Richtlinien des Bundesamtes für Statistik definiert. Der Chi-Quadrat-Test wurde mit Hilfe der Statistiksoftware Stata®, Version 7.0 durchgeführt und das Signifikanzniveau bei $p < 0{,}05$ festgelegt.

RESULTATE

Beteiligung

Tabelle 1 stellt die Beteiligung an den Erhebungen von 2005 und 1999–2003 nach Art der Datenerhebung dar. Im Vergleich zur vorhergehenden Studie nahm die Beteiligung um ca. 20% zu; die durchschnittliche Antwortrate lag 2005 je nach Altersgruppe zwischen 81 und 85%. Der Rücklauf war wie zu erwarten am höchsten nach dem ersten Brief (46–59%), am zweithöchsten nach dem zweiten Schreiben (19–23%) und am geringsten nach dem dritten Kontakt (6–12%) (Abbildung 1). Dieses Schema lässt sich bei allen drei Altersgruppen erkennen. Der telefonische Kontakt war am erfolgreichsten bei Eltern von Kleinkindern, da diese öfters zu Hause sind.

Durchimpfung

Tabellen 2 und 3 detaillieren die Durchimpfung von allen drei Altersgruppen. Obwohl sich generell in vielen Kantonen eine leichte Zunahme abzeichnet, hat sich das Impfniveau bei Kleinkindern gegen Di, Te, Pol und drei Dosen Per in den letzten sechs Jahren kaum verändert (Tabelle 2). Dennoch ist die Durchimpfung für einige Impfungen signifikant angestiegen: für Hib mit drei Dosen von 90,4% auf 93,0%, mit vier Dosen von 77,2% auf 82,3%, für MMR mit einer Dosis von 81,1% auf 86,2% (Masern), von 79,7% auf 84,9% (Mumps) und von 79,1% auf 84,9% (Röteln) und mit vier Dosen Per von 78,8% auf 83,1%. In beinahe allen Kantonen lässt sich derselbe Trend erkennen. Einzig im Kanton SZ nahm die Durchimpfung gegen Di, Te, Per, Pol und Hib markant und diejenige gegen MMR in geringem Masse ab. Im Kanton BL hingegen erhöhte sich die Durchimpfungsquote für alle empfohlenen Impfungen sehr deutlich. Erwähnenswert ist auch die von 51,3% auf 84,9% gestiegene Durchimpfungsrate für Röteln im Kanton SH.

Der durchschnittliche nationale Impfgrad von Schulkindern hat sich bei allen Impfungen verbessert (Tabelle 3). Die Durchimpfung mit fünf Dosen Di, Te und Pol bei 8-Jährigen ist von 65–66% auf beinahe 80% gestiegen. Der Anstieg für die zweite Dosis MMR, die vierte und fünfte Dosis Per und die dritte und vierte Dosis Hib ist sogar noch markanter, nämlich von 46,3% auf 73,9% (Ma2), von 45,4% auf 72,6% (Mu2), von 45,2% auf 71,8% (Ro2), von 54,7% auf 87,3% (Pe4), von 14,6% auf 67,6% (Pe5), von 74,1% auf 89,2% (Hib3) und von 14,8% auf 73,6% (Hib4). Auch die Impfquote von Jugendlichen hat seit dem letzten Erhebungszeitraum deutlich zugenommen. Die Durchimpfung mit sechs Dosen Di stieg von 50,0% auf 62,3%, mit sechs Dosen Te von 51,1% auf 63,7%, mit vier Dosen Per von 10,7% auf 24,4%, mit fünf Dosen Pol von 78,2% auf 83,6% und mit zwei Dosen MMR von 51,0% auf 75,0%, von 49,9% auf 73,1% respektive von 46,4% auf 72,6%. Die Durchimpfung mit einer Dosis Hepatitis B (HB) stieg von 29,7% auf 65,3%, mit zwei Dosen von 24,9% auf 60,8% und mit drei Dosen von 13,2% auf 36,8%.

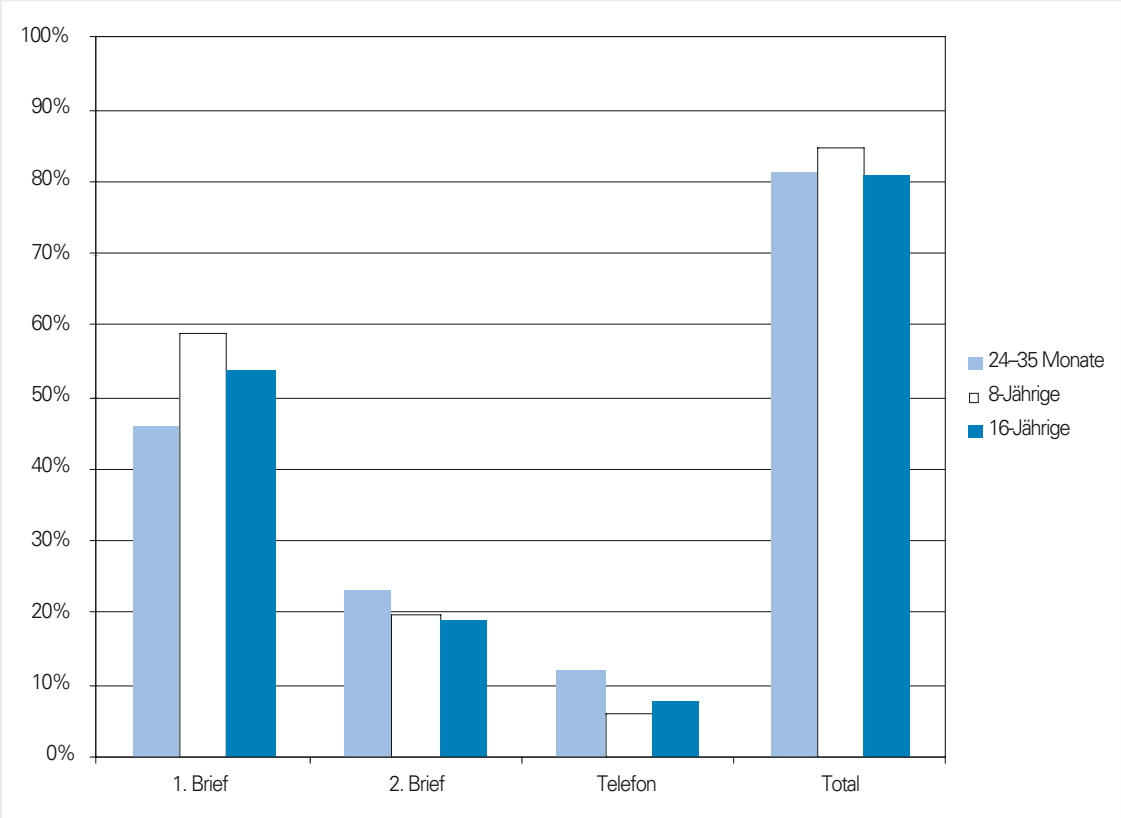
Im Gegensatz zu den Schulkindern der anderen sieben Kantone, die 2005 teilgenommen haben, hat die Durchimpfungsrate auch bei Jugendlichen im Kanton SZ stark abgenommen. Bei den 8-Jährigen stieg das Impfniveau nur mit drei und vier Dosen Hib von 76,2% auf 88,1% und von 33,5% auf 68,5%; mit vier Dosen Per nahm es von 76,7% auf 63,2% signifikant ab.

Tabelle 1
Rücklauf (%) der Impfausweise nach Art der Datenerhebung und kantonale Spannweite, 1999–2002 und 2005

	N	Mittelwert (%)	Spannweite (%)
Kleinkinder			
– Gemeinden (1999–2001)	4853	65	56–80
– Gemeinden (2005)	3398	82	75–88
Schuleintritt			
– Schulschwestern (1999–2002)	1876	75	73–78
– Schulärzte (1999–2002)	1532	71	57–81
– Lehrer (2000)	712	53	53
– Gemeinden (2000)	605	61	61
– Gemeinden (2005)	3192	85	76–91
Schulaustritt			
– Schulschwestern (1999–2002)	1859	71	58–92
– Schulärzte (1999-2002)	1520	68	60–79
– Lehrer (2000)	725	52	52
– Gemeinden (2000)	600	47	47
– Gemeinden (2005)	3181	81	72–88

Kantone: AG, AI, BL, BS, NE, SH, SZ, SO, ZH. Schulkindern: ohne BS. N: Stichprobengrösse. Anzahl der Kantone 1999–2002 mit Erhebung durch Schulschwestern: 3; Schulärzte: 3; Lehrer: 1; Gemeinden: 1.

Abbildung
Rücklauf (%) der Impfausweise nach Antwortzeit, 2005



DISKUSSION

Ein Vergleich der aktuellen nationalen Durchimpfung von Kleinkindern mit derjenigen von 1999–2001, verdeutlicht, dass sich die Impfquote für MMR, Hib und vier Dosen Per signifikant erhöht hat [1]. Während der Impfgrad in acht von neun im Jahre 2005 teilnehmenden Kantonen generell angestiegen ist, lässt sich im Kanton SZ ein deutlicher Rückgang erkennen.

Die Impfrate für Di, Pol und R hat bei Kleinkindern das von der WHO und dem BAG empfohlene Niveau erreicht, um Ausbrüche in der Bevölkerung zu vermeiden [4, 5]. Damit dieses Niveau aber auch für die anderen Impfungen erreicht werden kann, wären mehr Massnahmen erforderlich. Kürzliche Masernausbrüche in den Kantonen GE, VD und LU zeigten, dass die Durchimpfung gegen Masern zwar hoch genug ist, um die Krankheit im Zaum zu halten, dass die Anzahl Krankheitsfälle in Gebieten mit ungenügendem Impfniveau jedoch plötzlich zunehmen kann [6, 7].

Unterschiedliche Faktoren könnten für den Anstieg der Impfrate verantwortlich sein. Bei Hib ist die Zunahme möglicherweise auf die Applikation kombinierter Impfungen zurückzuführen. Bei Pertussis hat wahrscheinlich der Wechsel vom zellulären zum azellulären Impfstoff aufgrund seiner reduzierten Reaktogenizität zu einer vermehrten Akzeptanz bei Ärzten und Eltern geführt [8, 9]. Lokale Masernausbrüche in der Schweiz in den Jahren 2003–2004 könnten unschlüssige Eltern zudem dazu bewogen haben, ihre Kinder doch noch impfen zu lassen [6, 7, 10]. Des Weiteren hat möglicherweise auch die Impfkampagne des BAG zum verbesserten Impfniveau beigetragen. Zu guter Letzt braucht es nach der Einführung von neuen Empfehlungen häufig auch eine gewisse Zeitspanne, bis sie vom medizinischen Personal und von der Bevölkerung voll akzeptiert werden.

Seit ihrer Einführung 1998 hat die HB-Impfung an Akzeptanz gewonnen und das Wissen über die Krankheit zugenommen. Diese beiden Faktoren sowie verbesserte Impfkampagnen in den Schulen haben wahrscheinlich zu der höheren HB-Durchimpfung geführt. Ein weiterer Grund für die erhöhte Impfrate könnte der Wechsel des Impfschemas bei Jugendlichen von 3 auf 2 Dosen für einzelne HB-Impfstoffe sein. Die gestiegene Impfquote bei

Tabelle 2
Durchimpfung (%) bei 24–35 Monate alten Kindern in der Schweiz (9 Kantone), 1999–2001 und 2005

Kanton/Untersuchungsdatum	Di3	Di4	Te3	Te4	Per3	Per4	Pol3	Pol4	Hib3	Hib4	Ma1	Ma2	Mu1	Mu2	Ro1	Ro2
AG																
2000	95.0	83.1	95.5	82.9	91.9	81.0	96.6	83.5	89.9	80.7	82.5		79.7		78.4	
2005	97.2	85.0	97.2	85.0	95.3	83.7	96.3	83.9	95.0	83.1	86.8	68.9	85.1	68.4	85.1	68.3
AI																
2000	90.9	66.8	92.4	67.2	89.8	63.7	92.4	70.7	87.3	60.8	71.3		71.3		71.3	
2005	90.2	76.2	90.2	76.2	90.2	76.2	90.2	76.2	89.4	74.6	72.5	38.9	72.5	38.9	72.5	38.9
BL																
2001	95.4	78.2	96.4	78.2	89.8	75.1	94.6	75.3	86.3	68.3	75.6		73.7		73.6	
2005	95.9	85.5	96.1	85.5	93.9	85.3	94.9	84.4	94.0	85.1	85.1	75.3	83.8	74.9	83.8	74.9
BS																
2000	94.7	78.7	95.0	79.3	90.4	76.8	94.6	77.3	87.8	71.8	78.5		74.3		74.1	
2005	94.5	81.7	94.5	81.7	93.6	81.2	94.0	81.7	91.4	78.7	85.5	76.0	85.1	74.4	85.1	75.0
NE																
2000	96.7	87.9	97.9	87.7	94.9	85.9	96.7	86.8	90.8	75.5	89.4		89.0		89.4	
2005	97.1	90.4	98.2	90.7	96.1	90.4	97.1	90.3	96.1	90.7	93.7	85.0	93.7	85.0	93.7	85.0
SH																
2001	95.4	79.0	96.3	79.0	93.1	64.5	94.3	61.1	91.1	78.6	75.0		69.2		51.3	
2005	94.9	86.2	94.9	86.2	94.4	86.2	94.9	86.2	94.6	86.2	86.6	75.0	84.9	73.8	84.9	73.8
SZ																
2001	93.0	79.4	93.4	79.8	90.8	77.9	93.0	78.9	91.3	77.3	80.0		79.1		79.3	
2005	85.7	72.2	87.5	72.2	82.1	70.9	85.3	70.8	79.9	69.1	75.4	62.9	74.9	62.9	74.9	62.9
SO																
2000	97.1	82.4	97.5	82.4	94.9	80.2	96.8	80.1	93.5	76.1	81.0		79.9		79.9	
2005	95.2	86.5	95.6	86.7	92.7	86.1	93.8	86.1	91.9	84.6	85.2	62.9	83.6	61.6	83.6	61.8
ZH																
1999	95.1	82.7	95.6	82.7	91.9	78.6	95.3	82.0	91.1	78.8	81.4		81.1		81.1	
2005	96.2	82.8	96.3	82.9	94.4	82.4	94.4	82.0	93.4	81.5	86.8	68.8	85.3	67.4	85.3	67.6
1999–2001																
Mittelwert 9 Kantone	95.2	82.1	95.8	82.1	92.0	78.8	95.5	80.9	90.4	77.2	81.1		79.7		79.1	
2005																
Mittelwert 9 Kantone	95.6	83.7	95.9	83.8	93.8	83.1	94.4	82.9	93.0	82.3	86.2	70.0	84.9	69.1	84.9	69.2
CH 1999–2003 [1]	**95.4**	**83.6**	**95.9**	**83.7**	**92.9**	**81.3**	**95.3**	**82.7**	**91.1**	**79.3**	**82.3**		**81.1**		**80.8**	
CH 1998 [2]	94.3	71.7	93.3	71.5	88.1	68.2	92.1	76.2	76.9	47.4	81.4		78.9		78.7	
CH 1991 [3]	95.0	71.1	93.3	70.9	88.8	–	94.8	70.4	–	–	83.1		80.1		79.6	

Tabelle 3
Durchimpfung (%) von Schulkindern in 8 Kantonen, 1999–2002 und 2005

a) Schuleintritt			b) Schulaustritt		
Jahr	1999–02	2005	Jahr	1999-02	2005
n	3227	2685	n	3004	2541
Di4	93.3	95.1	Di5*	81.2	85.9
Di5*	66.4	77.9	Di6*	50.0	62.3
Te4	93.5	95.4	Te5*	81.9	86.2
Te5*	66.5	77.9	Te6*	51.1	63.7
Per4*	54.7	87.3	Per3	82.6	83.1
Per5*	14.6	67.6	Per4*	10.7	24.4
Pol4	92.4	94.1	Pol4*	88.5	91.7
Pol5*	65.0	75.4	Pol5*	78.2	83.6
Hib3*	74.1	89.2	HB1*	29.7	65.3
Hib4*	14.8	73.6	HB2*	24.9	60.8
			HB3*	13.2	36.8
Ma1	88.7	89.5	Ma1	94.4	94.8
Ma2*	46.3	73.9	Ma2*	51.0	75.0
Mu1	87.4	88.2	Mu1	94.0	93.9
Mu2*	45.4	72.6	Mu2*	49.9	73.1
Ro1	86.6	88.0	Ro1	92.0	93.9
Ro2*	45.2	71.8	Ro2*	46.4	72.6

Kantone: AG, AI, BL, NE, SH, SZ, SO, ZH. 1999–2002: 1.–2. und 6.–9. Klassen; 2005: 8- und 16-Jährige.
*$p < 0.05$.

Schulkindern dürfte zusätzlich auch auf das höhere Alter der an dieser Studie teilnehmenden Kinder zurückzuführen sein. In der Studie von 1999–2003 wurden die Impfinformationen bei Kindergärtlern bis zu Zweitklässlern (in einem Kanton bei Drittklässlern) und bei Siebt- bis Neuntklässlern (in einem Kanton bei Sechstklässlern) erhoben. Im 2005 waren die Kinder 8 und 16 Jahre alt. Weil in den Zielgruppen der aktuellen Erhebung Kinder vertreten sind, die ein Jahr älter sind als das im Schweizerischen Impfplan vorgesehene maximale Alter, dürften nun auch ein grosser Teil der Nachholimpfungen erfasst worden sein [11].

Im Gegensatz zu den übrigen Kantonen hat im Kanton SZ die Durchimpfungsrate für Di, Te, Per, Pol und in einem geringeren Masse für MMR bei Kleinkindern und Jugendlichen abgenommen. Diese Tatsache lässt darauf schliessen, dass viele Eltern Impfungen im Allgemeinen für ihre Kinder ablehnen und nicht, wie früher, nur die MMR-Impfung. Ein Hauptgrund für die Abnahme könnte der starke Einfluss von Alternativmedizinern sein, welche junge Eltern möglicherweise unempfänglich machen für Impfinformationen und Impfkampagnen. Gemäss einem Kinderarzt im Kanton SZ verfügt die Region Einsiedeln über deutlich mehr Homöopathen als andere Gebiete im Kanton, was dazu führt, dass die Durchimpfung in Einsiedeln viel tiefer ist als in anderen Regionen [S. Rupp, Kinderarzt, persönliche Mitteilung]. Auch eine aktuelle Erhebung im Kanton VD bestätigt, dass Kinder, die hauptsächlich von Homöopathen behandelt werden, weniger oft gegen MMR geimpft sind als Kinder, die von Kinderärzten behandelt werden [8]. Ausserdem nahm die MMR-Impfrate im Kanton SZ vor ein paar Jahren wider Erwarten leicht ab, nachdem in den Schulen die Impfbroschüren des BAG verteilt wurden [M. Hofstra, Schulgesundheitsdienst SZ, persönliche Mitteilung, 2006]. Der Kanton SZ hat sich die Priorität gesetzt, die Durchimpfung bei Schulkindern in den nächsten Jahren zu steigern.

Bei den Jugendlichen hat die Nationalität einen starken Einfluss auf das Impfniveau: Ausländische Kinder verfügen über eine deutlich niedrigere Durchimpfung als Schweizer Kinder. Dies muss jedoch mit Vorsicht betrachtet werden. Es besteht die Möglichkeit, dass die Impfquote von ausländischen Kindern in Realität höher ist, weil die Daten nur die in den Impfausweisen dokumentierten Impfungen widerspiegeln. In den Heimatländern dieser Kinder wurden aber vielleicht Impfungen verabreicht und nicht vermerkt oder der Impfausweis ging verloren.

Obwohl der Rücklauf mit über 80% deutlich zugenommen hat, kann eine Nichtbeantwortungsrate von 20% immer noch zu einer Fehleinschätzung der erhobenen Durchimpfung führen. Die Gründe für eine Nichtbeantwortung wurden erfasst, und weniger als 1% haben eine negative Haltung Impfungen gegenüber als Ursache dafür angegeben, nicht an der Studie teilgenommen zu haben. Trotzdem muss die Nichtbeantwortungsrate ernst genommen werden, da nicht alle ausgewählten Familien kontaktiert werden konnten und die Resultate zeigen, dass der Zeitpunkt der Antwort deutlich mit dem Grad der Durchimpfung korreliert: Die Kinder von Eltern, die erst auf den telefonischen Kontakt hin reagiert hatten, weisen ein tieferes Impfniveau auf als jene Kinder von Familien, die bereits auf den ersten oder zweiten Brief geantwortet hatten. Schon früher hatte eine Studie im Kanton BL gezeigt, dass der Zeitpunkt der Antwort in einer Erhebung mit dem Grad der Durchimpfung verbunden ist [12]. Um das Kooperationsniveau zu erhöhen, ist es folglich wichtig, die Methode zu verbessern. Die Beteiligung hat von 1999/2003 bis 2005 um ca. 20% zugenommen, was wahrscheinlich dem Weglassen eines zusätzlichen Fragebogens und der besseren Datenerhebungsmethode zu verdanken ist.

Bis Dezember 2007 wird die Datenerhebung in 25 Kantonen beendet sein. Ein Kanton beteiligt sich noch nicht an der aktuellen nationalen Erhebung. Die Daten zur nationalen Durchimpfung werden im 2008 veröffentlicht. Viele der Einschränkungen in der Studie von 1999–2003, v.a. die Vergleichbarkeit zwischen den 26 Kantonen, wurden im Erhebungszeitraum 2005–2007 eliminiert. Die Zusammenarbeit mit den Kantonen war hervorragend, und die meisten Kantone werden für alle drei Altersgruppen dieselbe Methode anwenden. Aufgrund logistischer und finanzieller Gründe werden drei Kantone die Datenerhebung von Schulkindern weiterhin

mit den Schulkrankenschwestern der gut organisierten Schulgesundheitsdienste durchführen.

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