Die Bundesregierung

wirksam regieren

Information on the measles vaccination

Analysis of information provided by mail regarding measles vaccinations for adults

wirksam regieren division at the Federal Chancellery on behalf of the Federal Ministry of Health (BMG)

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Executive Summary

Measles is one of the most contagious human diseases. It occurs in both children and adults, and can lead to complications such as lung, middle ear and brain inflammation.[1] Vaccinations offer effective protection against this disease. Outbreaks of measles are still occurring in Germany, however.

Since 1984, the member states of the European Region of the World Health Organization (WHO) have been striving to eliminate measles. The level required by the WHO of less than one case of measles per 1 million inhabitants per year has not been achieved in Germany to date. Other countries have demonstrated that this goal is achievable. For Germany, achieving this goal would mean fewer than 80 cases of measles per year. However, according to the Robert Koch Institute - Federal Institute for Infectious and Non-communicable Diseases (RKI), 401 people contracted measles in Germany in the first quarter of 2017 alone.[2]

In its National Action Plan for the Elimination of Measles and Rubella in Germany 2015 - 2020, the Federal Government has pledged to eliminate measles in Germany.[3] To achieve this goal, the immunity of the population in all age groups must reach at least 95%. Mathematical model calculations have shown that only by reaching this goal can endemic virus transmissions be prevented and the number of cases of measles permanently reduced.[4]
This phenomenon is known as herd immunity.

In Germany, immunity against measles varies considerably by age group and region. The measles vaccine was first introduced in 1970 and was mandatory in the GDR.
For those born before 1970, extensive immunity is assumed, as these persons are presumed to have already had measles. For those born after 1970, immunity is significantly lower.[5] In addition to this, recent studies have shown that *two* vaccinations against measles are needed to ensure immunity, instead of the previously recommended *single* vaccination. Since 2010, the Standing Committee on Vaccination (STIKO) at the RKI has therefore recommended a booster vaccination for those born after 1970 if they have only received one vaccination or if their vaccination status is uncertain.[6]

The relatively low immunity in this group is reflected in the number of infections. Out of 929 cases of measles in 2017, around a third of those affected were born between 1971 and 1998. In 2017, 328 cases of measles occurred within this group.[7]

In a survey carried out by the Federal Centre for Health Education (BZgA) in 2014, when asked about their incomplete vaccination, those born after 1970 who had not received any vaccinations against measles most commonly cited the following three reasons: [8]

1. 60% stated they did not know they needed a measles vaccination
2. 25% were concerned about possible side effects of the measles vaccine and
3. 19% assumed that measles was not a particularly serious disease.

Only around a quarter of those who responded stated that they knew about the recommendations for measles vaccinations in adults which have been in place since July 2010.

In light of these findings, the National Action Plan for the Elimination of Measles and Rubella in Germany recommends targeted education about measles and the measles vaccination among individuals born after 1970.[9]

Against this background, the Federal Ministry of Health (BMG) commissioned the *wirksam regieren* division to carry out two randomised controlled trials regarding vaccination information. The studies were carried out in the fourth quarter of 2016.

This study, carried out in cooperation with the Techniker Krankenkasse (TK) health insurance provider, the Federal Centre for Health Education (BZgA) and the Robert Koch Institute (RKI), investigated how the knowledge gap surrounding measles vaccinations in the target group can [10] most effectively be closed.

The study focused on the following question: How can individuals born after 1970 be informed of the facts regarding the prevalence and possible consequences of measles, as well as the benefits and potential side effects of the measles vaccination in a manner that is easiest for them to understand? The aim was to close the information gap regarding measles prevention for as many people as possible, and to allow them to make an informed decision about the measles vaccination. The information provided via a letter from the health insurance company was the focus of the study.

Six different sets of information were tested altogether, all of which varied in terms of their information density and their graphical content.
The information was sent by letter by TK to their customers.

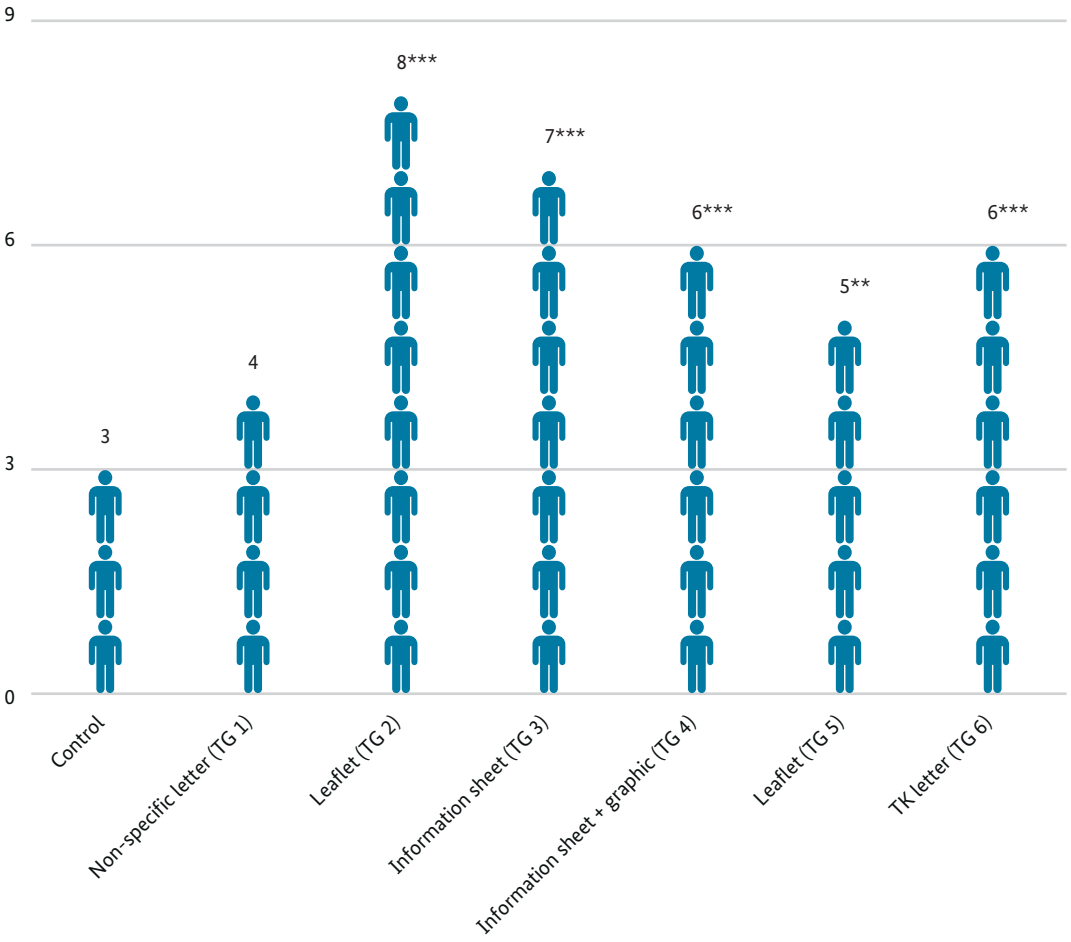
The study was designed to determine whether the information provided on the measles vaccination was understandable and improved the recipients' knowledge. To this end, some of the recipients were asked to complete an online questionnaire about their knowledge of and attitudes towards the measles vaccination (see *reference materials in Appendix A4*). In addition, the study was designed to investigate whether this information also led to an increase in vaccination rates.

Due to a low number of participants in the online survey, no statistically valid results could be obtained regarding the individuals' knowledge about measles.

The results of the trial show that 3 out of 1,000 adults "spontaneously" - without explicitly being prompted - got a measles vaccination between November 2016 and January 2017 (this is known as the base rate, see "Control" in *Figure 1*). As a result of the postal appeal specifically recommending a measles vaccination, depending on the informational approach, there was a statistically significant increase in vaccination figures to 5 to 8 vaccinations per 1,000 adults compared to the control group (see *Figure 1*).[11] A non-specific letter which did not explicitly discuss measles vaccination, but rather generally encouraged recipients to check their vaccination status, did not increase the number of vaccinations compared to the control group by a statistically significant amount (see TG 1).

The randomised controlled trial (RCT) allowed the causal effect of information about measles vaccinations to be demonstrated.

Figure 1: Number of measles vaccinations per 1,000 adults Nov. 2016 – Jan. 2017



*** p < 0.001, ** p < 0.01, * p < 0.05 [12]

A second study was carried out simultaneously in cooperation with Allgemeine Ortskrankenkasse (AOK) health insurance providers, which focused on the provision of information in GP practices. A written request from the Federal Ministry of Health to GPs to specifically educate their patients regarding the current vaccination recommendations and the risks of measles and the measles vaccination was shown not to lead to any statistically significant increase in the number of measles vaccinations.[13] A separate results report is available for this.

The results of both studies illustrate that the various measures differ considerably in their effectiveness. A comparison of the two studies has been published on the website www.bundesregierung.de/wirksam-regieren. They demonstrate the contribution that impact analyses can make to project planning. Early causal impact analyses of alternative actions can allow effective measures to be identified and evidence-based actions to be taken.

Key Results

1. Increase in the number of vaccinations from 3 to up to 8 vaccinations per 1,000 adults through simple, fact-based information.
2. Costs of EUR 125 per additional measles vaccination

I. Research Question

Since 1984, the member states of the European Region of the World Health Organization (WHO) have been striving to eliminate measles. The level required by the WHO of less than one case of measles per 1 million inhabitants per year has not been achieved in Germany to date. For Germany, this would mean a maximum of 80 cases of measles per year. According to the Robert Koch Institute (RKI), 929 people contracted measles in Germany in 2017.[14] In particular, children younger than one year old, who cannot be vaccinated, are commonly infected in Germany. Young people are also affected, however, including young adults who were born after 1970 and who are not sufficiently vaccinated. In 2017, around 30% of the people who contracted measles were adults born after 1970.[15]

This indicates a significant immunity gap among adults. Currently, the vaccination rate is between 25% and 80% depending on age and gender.[16] The vaccination rate among 18 to 29-year-olds, for example, is 80%, whereas among 30 to 39-year-olds, it is only around 47%.[17] The measles vaccine was introduced in 1970, and was mandatory in the GDR. For people born before 1970, it is assumed that they have already had measles and are therefore largely protected. An immunity rate of 95% is assumed in this group.

In its National Action Plan for the Elimination of Measles and Rubella in Germany in 2015 - 2020, the Federal Government has pledged to eliminate measles in Germany.[18] In order to prevent endemic virus transmissions and therefore reduce the number of cases of measles in the long term, mathematical models show that immunity must be present in 95% of the population. At this level, so-called herd immunity would be achieved. According to the latest findings, two measles vaccinations are generally required to achieve permanent immunity, with the Standing Committee on Vaccination (STIKO) at the Robert Koch Institute (RKI) recommending that the first vaccination be given at the age of 11 - 14 months, and the second at the age of 15 - 23 months. In the past, one measles vaccination was considered adequate.

Since 2010, STIKO has recommended a booster vaccination for adults born after 1970 who have only received one vaccination or whose vaccination status is unknown.[19] This recommendation is also made on the basis of the higher complication rates associated with measles in adults (such as lung, middle ear and brain inflammation).[20]

A survey from 2014 by the Federal Centre for Health Education (BZgA) [21] reveals the three key obstacles to vaccination for people with incomplete immunity in this age group:

1. 60% stated they did not know they needed a measles vaccination
2. 25% were concerned about possible side effects of the measles vaccine and
3. 19% assumed that measles was not a particularly serious disease.

Only around a quarter of those who responded stated that they knew about the recommendations for measles vaccinations in adults which have been in place since July 2010.

Increasing the number of measles vaccinations is an important issue for the Federal Government. Against this backdrop, the Federal Ministry of Health (BMG) commissioned the *wirksam regieren* division to carry out a randomised controlled trial (RCT). The aim was to investigate the effect of factual information on knowledge and behaviour relating to vaccinations among adults born between 1970 and 1998.

The study examined different informational materials, which provided factual information about the disease, the vaccination process and the side effects of the vaccine to members of the target group. These were intended both to clarify the importance of the issue and to provide support in making an informed decision regarding vaccination.

The approach of sending letters to the target group by post via a health insurance provider was chosen for the following reasons: It was assumed that people are more receptive to information sent to their home as the information can be read at leisure. This communication channel also provides the opportunity to reach as many individuals as possible in this target group. As health insurance providers hold demographic data about their customers, it is possible to appeal directly to individuals in the relevant age group. The design of the study also allowed billing data relating to the measles vaccinations to be used to determine whether a vaccination took place after an information letter was sent out. The protection of private data was guaranteed because the *wirksam regieren* division only had access to completely anonymised data in the study, which gave no indication of the specific identities of the individuals involved.

The study used both information materials about measles vaccinations which had already been published and new materials. Existing materials included a leaflet from the National Association of Statutory Health Insurance Physicians (KBV) and a graphic by the Federal Centre for Health Education (BZgA), which were provided by both institutions for the purposes of the study. An information sheet drawn up by the *wirksam regieren* division in collaboration with the Robert Koch Institute (RKI) was also used.

The explicit objective of the study was to investigate and compare these different materials in terms of their comprehensibility and effect on vaccination behaviour in adults.

A second study was carried out simultaneously in cooperation with Allgemeine Ortskrankenkasse (AOK) health insurance providers, which focused on the provision of information in GP practices. A separate results report is available for this.[22]

II. Study

Various information letters were compared in a randomised controlled trial. To this end, as a first step, 106,000 men and women born between 1970 and 1998 were selected at random from TK's customer database.[23] These individuals were then also randomly assigned either to one of six test groups or the control group ~~(randomisation)~~.[24]

In each of these groups, 1,000 people were then selected at random and also asked to take part in a short online survey on the subject of measles vaccination. The online survey focused on knowledge and attitudes surrounding measles vaccinations and was intended to ascertain whether the information sent out had improved the respondents' knowledge of measles vaccinations (see *reference materials Appendix A4*).

Table 1 shows the gender and age distribution of the overall random sample. The various information letters were sent out by TK at the end of October 2016 to the individuals in the test groups. TK has access to the individuals' vaccination data through the billing codes included with doctors' invoices. This information was used to check how vaccination figures differed after the sending of information letters in the test groups compared to a control group who did not receive any letters. For the analysis, measles vaccinations up to and including January 2017 were taken into account, so the observation period was ~~to~~ around three months.

Table 1: Gender and age distribution of the overall random sample

Characteristic	Distribution in %
Gender	
Male	54
Female	46
Age (years)	
18 – 25	18
26 – 30	23
31 – 35	20
36 – 40	18
41 – 46	21

Behavioural science background

As highlighted by the above survey results, there is a significant knowledge deficit in the target group relating to measles.[25] To improve general knowledge about measles and the benefits and side effects of the measles vaccination, various letters and information materials were sent to the target group.

• Media channel

A postal method was selected as the means of contacting the target group. This is also the primary channel generally used by the health insurance provider to communicate with its customers. This channel is especially suitable for the personalised communication of detailed and complex information, and is generally considered trustworthy.[26] In particular, it allows the recipients to engage with the information in their own time.

Moreover, this media channel makes it possible to reach those members of the target group who do not visit a doctor regularly and who do not actively engage with health matters. This is illustrated by the fact that, in a recent study, between 16 and 20 percent of the men in the target group stated that they had not seen a doctor in 2017. [27]

- **Easy-to-understand health information and risk communication**

One possible method of reducing the described knowledge deficit is to communicate easy-to-understand health information tailored to the target group. When communicating this information, natural frequencies (for example "10 in 10,000" instead of the relative frequency "1%") and absolute risk information were used. In empirical studies, the use of natural frequencies has proven to be more comprehensible compared to relative probability representations, both for experts and non-experts.[28, 29, 30]

The information sheet developed by *wirksam regieren* explained both the frequency and the consequences of measles, as well as the frequency and the nature of vaccination side effects using natural frequencies. The corresponding information is based on the latest figures from the RKI.[31] No images were used (see *Figure 3a*).

- **Behavioural science research on the measles vaccination**

Many of the studies dealing with the communication of risks associated with the measles vaccination focus on how to appeal to parents in order to convince them of the importance of vaccinating their children.[32] Other studies focus on how to change opinions based on incorrect myths about vaccination. This study, however, aimed to provide information in the most neutral way possible, in order to help individuals make an informed, fact-based decision about vaccination.

Within applied health psychology and health-related risk communication, techniques are often promoted which play on fears (e.g. images of people suffering from measles), as well as implicit influencing techniques such as framing [33, 34, 35] or reference to social norms [36, 37, 38]. *Wirksam regieren* ruled out the use of these communication techniques on ethical grounds. These techniques could be considered manipulative, as patients are not generally aware of how they work, nor is this explained to them, and as the use of these techniques does not contribute to providing knowledge or building expertise.

- **Health psychology models**

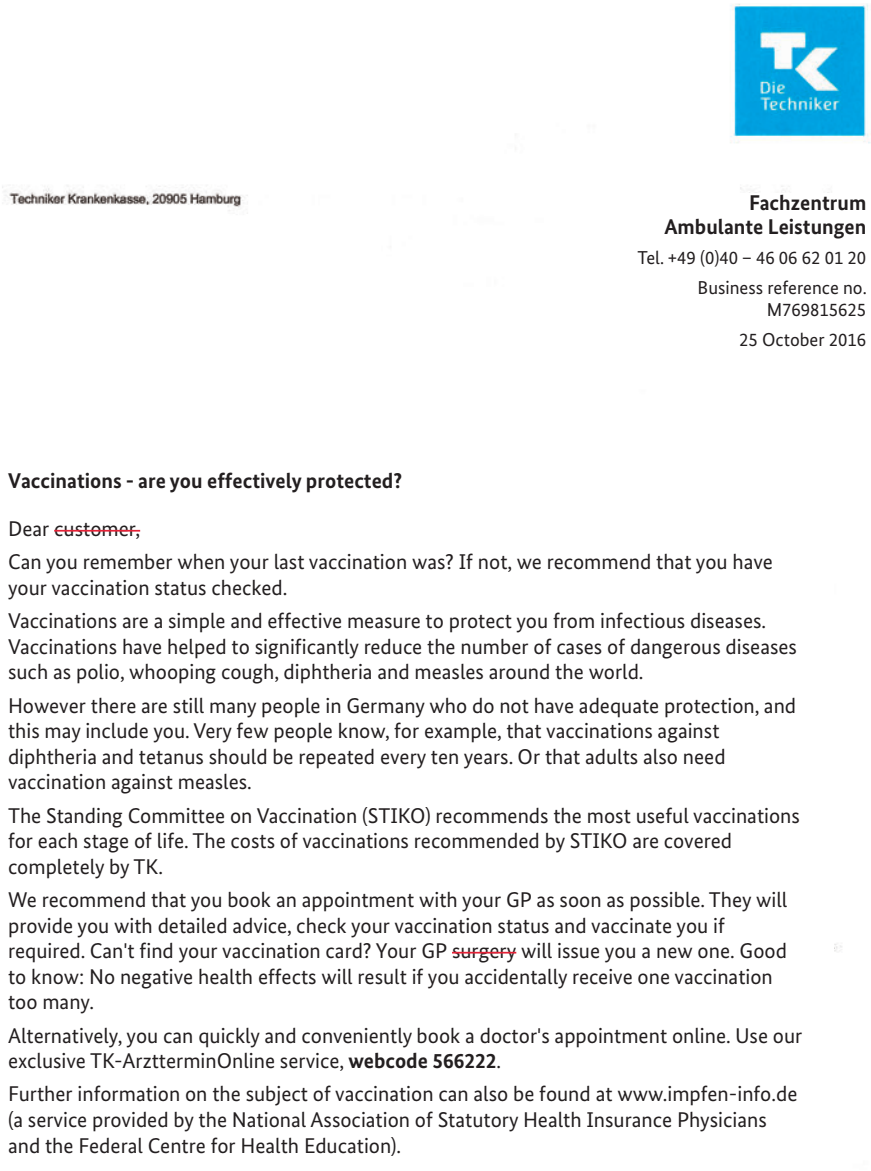
While designing this communication and the informa-tion leaflets, *wirksam regieren* consulted health psychology models dealing with the question of which information is considered by patients when making a decision about preventative healthcare. Thus, based on health psychology process models for measles vaccination, it can be assumed that recipients will ask themselves the following questions when making their decision: How dangerous is the measles virus for me/my family (risk perception)? What are the possible consequences of a vaccination (action-out-come expectations regarding vaccination and side effects)? Do I know what I need to do in order to get vaccinated (perceived self-efficacy)? [39] All three of these elements – risk perception, action-outcome expectations and self-efficacy – were addressed using neutral and objective information.

In order to encourage a possible decision in favour of vaccination, the letter presented concrete steps for arranging a measles consultation or vaccination appointment.[40]

Test groups

Six different letter types were tested in total:
Test group 1: This test group received a **general vaccination letter** (see *Figure 2*). The letter asked customers to think about the issue of vaccination and to check their own vaccination status. Measles was only generally referred to in the context of other diseases, such as tetanus or diphtheria. The general vaccination letter, as opposed to a specific measles vaccination letter, was designed to prevent customers possibly considering the letter irrelevant upon first receiving it and not giving any thought to the measles vaccination because they assume measles is only a childhood illness. The letter also corresponds to the possible approach used by public information campaigns raising awareness about vaccinations in general.

Figure 2: Letter to test group 1



Techniker Krankenkasse, 20905 Hamburg

Fachzentrum
Ambulante Leistungen
Tel. +49 (0)40 – 46 06 62 01 20
Business reference no.
M769815625
25 October 2016

Vaccinations - are you effectively protected?

Dear ~~customer,~~

Can you remember when your last vaccination was? If not, we recommend that you have your vaccination status checked.

Vaccinations are a simple and effective measure to protect you from infectious diseases. Vaccinations have helped to significantly reduce the number of cases of dangerous diseases such as polio, whooping cough, diphtheria and measles around the world.

However there are still many people in Germany who do not have adequate protection, and this may include you. Very few people know, for example, that vaccinations against diphtheria and tetanus should be repeated every ten years. Or that adults also need vaccination against measles.

The Standing Committee on Vaccination (STIKO) recommends the most useful vaccinations for each stage of life. The costs of vaccinations recommended by STIKO are covered completely by TK.

We recommend that you book an appointment with your GP as soon as possible. They will provide you with detailed advice, check your vaccination status and vaccinate you if required. Can't find your vaccination card? Your GP ~~surgery~~ will issue you a new one. Good to know: No negative health effects will result if you accidentally receive one vaccination too many.

Alternatively, you can quickly and conveniently book a doctor's appointment online. Use our exclusive TK-ArztterminOnline service, **webcode 566222**.

Further information on the subject of vaccination can also be found at www.impfen-info.de (a service provided by the National Association of Statutory Health Insurance Physicians and the Federal Centre for Health Education).

Test group 2: In this test group, customers received a **specific measles vaccination letter** and also an information leaflet about the measles vaccination from the National Association of Statutory Health Insurance Physicians (KBV, see *Figures 3a and 3b*). Unlike in test group 1, the letter specifically and exclusively discussed the measles vaccination. The leaflet was designed in a pop-art style and was aimed at adults. It briefly and succinctly presented the importance of protection against measles for adults. The striking design was intended to support the aim of the letter, i.e. encouraging customers to engage more with the information provided on the topic.

Figure 3a: Letter to test groups 2 and 3

Techniker Krankenkasse, 20905 Hamburg

Fachzentrum
Ambulante Leistungen
Tel. +49 (0)40 – 46 06 62 01 20
Business reference no.
S424218117
25 October 2016

The measles vaccination - are you protected?

Dear ~~customer~~,

Vaccinations are a simple and above all effective measure to protect people from dangerous infectious diseases. However there are still many people in Germany who do not have adequate protection, and this may include you. This is especially true for measles.

Many people think of measles as a childhood illness. The reality, however, is that adults are also at risk: in 2015, 400 out of 1,000 people who contracted measles in Germany were over the age of 20. The condition is usually most serious in adults. Vaccination is a highly reliable way to prevent this.

The Standing Committee on Vaccination (STIKO) recommends the most useful vaccinations for each stage of life. According to its updated recommendations, all adults should receive a measles vaccination if they did not receive it during childhood or only received one vaccination. If you are in this group, you can simply catch up on your vaccinations now. You should also do this if you are unsure of your vaccination status. If you have one vaccination too many, it will not have any effect on your health.

Good to know: complete immunity means you are also protecting other people, especially infants and people with weakened immune systems who cannot be effectively vaccinated against measles themselves. In the long term, it will be possible to prevent the development of measles infections almost completely; this is a goal that has already long since been reached in some parts of the world, including in Europe, and one that we also want to achieve.

We recommend that you book an appointment with your GP as soon as possible. They will offer you detailed advice, vaccinate you if required and charge the vaccination directly to us via your TK insurance card. Alternatively, you can quickly and conveniently book a doctor's appointment online. Use our exclusive TK-ArztterminOnline service, **webcode 566222**.

Figure 3b: Leaflet to Test Group 2

Measles vaccinations are important for adults too!

- *Adults can also contract measles*

Measles cases are on the rise again in Germany: Around half of cases affect teenagers and adults who have been inadequately vaccinated or not at all.

- *Measles: not a harmless childhood illness*

In addition to complications such as middle ear or lung infections, around one in 1,000 people infected will develop inflammation of the brain. This can ultimately be fatal or lead to permanent physical disability. Serious consequences of the disease are much more common in teenagers and adults than in children.

- *Vaccination protects*

Vaccination is one of the simplest and most effective preventative measures for protecting against measles. Vaccinations protect more than just the people who receive them. If enough people are immunised, individual pathogens such as the measles virus can be eliminated.

KBV
Kassenärztliche
Bundesvereinigung

Who should be vaccinated against measles?

All adults born after 1970 if they:

- have not been vaccinated against measles yet
- only received one vaccination during childhood
- do not know if they have already been vaccinated or if they have had measles in the past

Children should receive two vaccinations between the ages of 11 months and 2 years. This will provide them with complete immunity.

Women intending to have children: Before becoming pregnant, women should check whether they have full measles protection. Measles vaccinations cannot be administered during pregnancy. For women who are immune to measles,their child is automatically protected during the first few months of life, during which vaccinations cannot be given (passive immunity).

More information can be found online at www.kbv.de/vorsorge

Test group 3: In this test group, customers received the same specific **measles vaccination letter** as test group 2 (see *Figure 3a*). In place of the leaflet, however, an **information sheet** about measles prepared by *wirksam regieren* in collaboration with the RKI was included (see *Figure 4*). This information sheet summarised all of the relevant information about measles and the measles vaccina-tion in a simple and neutral form. Numerical risk information was presented in the form of natural frequencies. In order to communicate information as neutrally as possible, the deliberate decision was made not to use any supplementary images or interpretative texts.

Figure 4: Information sheet about measles for test groups 3 and 4

What you need to know about measles vaccinations

To enable you to make an informed decision about a measles vaccination, we have summarised the key facts for you:

How dangerous is the measles virus for adults?

- In Germany, around **2,500** people contracted measles in 2015. As a result of patchy vaccination, regional outbreaks can occur at any time with a significantly increased risk of infection, as has been seen recently in Berlin.
- Between **10 and 55 in 1,000** people infected with measles will develop inflammation of the lungs and **1 in 1,000** people will develop inflammation of the brain as a result of the infection. This can result in perma-nent brain damage and can even be fatal.

When should adults be vaccinated?

- All adults born after 1970 who were not vaccinated during childhood or who only received one vaccination, or who are unsure of their vaccination status, should get **vaccinated against measles**.

How well does the measles vaccine protect adults?

- **950 out of 1,000** people who have not been vaccinated and who come into contact with the measles virus will be infected. Measles is therefore highly contagious.
- **10 out of 1,000** vaccinated people who come into contact with the measles virus will be infected despite having two vaccinations. Compared to not being vaccinated, the vaccination thus provides highly effective protection.

How serious is the risk of side effects after vaccination for adults?

- **2 to 5 people out of 100** who receive the vaccine will develop a non-infectious measles-like condition, which is generally associated with a mild, measles-like rash and fever, and rarely with joint pain.
- **0 to 1 out of 10,000** people who have been vaccinated will develop allergic reactions or a temporary reduc-tion in their platelet levels, which reduces blood clotting.

Test group 4: This test group was sent the specific **measles vaccination letter** which test groups 2 and 3 also received. In the text, however, the concept of herd immunity was also explained. Herd immunity is achieved when a high enough number of people have been vaccinated to ensure that there is almost no further transmission of the disease, thereby protecting infants and people with weakened immune systems who cannot receive vaccinations themselves. Test group 4 also received the same **information sheet** as test group 3, as well as a **graphic about herd immunity** from the Federal Centre for Health Education (BZgA). The principle of herd immunity was explained in visual terms with the help of the graphic. It explained that, when the population has an immunity rate of 95%, measles epidemics can be prevented and the community can be protected (see *Figure 5a and 5b*). As a result, compared to test group 3, the aspect of social responsibility was also raised in this group and an explanation was given as to why vaccinations can be important even if the individual's own risk may be perceived as low.

Figure 5a: Letter to test group 4

Techniker Krankenkasse, 20905 Hamburg

Fachzentrum
Ambulante Leistungen
Tel. +49 (0)40 – 46 06 62 01 20
Business reference no.
B483973935
25 October 2016

The measles vaccination - are you protected?

Dear ~~customer~~,

Vaccinations are a simple and above all effective measure to protect people from dangerous infectious diseases. However there are still many people in Germany who do not have adequate protection, and this may include you. This is especially true for measles.

Many people think of measles as a childhood illness. The reality, however, is that adults are also at risk: in 2015, 400 out of 1,000 people who contracted measles in Germany were over the age of 20. The condition is usually most serious in adults. Vaccination is a highly reliable way to prevent this.

The Standing Committee on Vaccination (STIKO) recommends the most useful vaccinations for each stage of life. According to its updated recommendations, all adults should receive a measles vaccination if they did not receive it during childhood or only received one vaccination. If you are in this group, you can simply catch up on your vaccinations now. You should also do this if you are unsure of your vaccination status. If you have one vaccination too many, it will not have any effect on your health.

Good to know: complete immunity means you are also protecting other people, especially infants and people with weakened immune systems who cannot be effectively vaccinated against measles themselves. In the long term, it will be possible to prevent the development of measles infections almost completely; this is a goal that has already long since been reached in some parts of the world, including in Europe, and one that we also want to achieve. This principle, known as herd immunity, is also clearly explained in the enclosed graphic.

We recommend that you book an appointment with your GP as soon as possible. They will offer you detailed advice, vaccinate you if required and charge the vaccination directly to us via your TK insurance card. Alternatively, you can quickly and conveniently book a doctor's appointment online. Use our exclusive TK-ArztterminOnline service, **webcode 566222.**

Figure 5b: Graphic about herd immunity for test group 4

Protecting yourself and others through vaccination

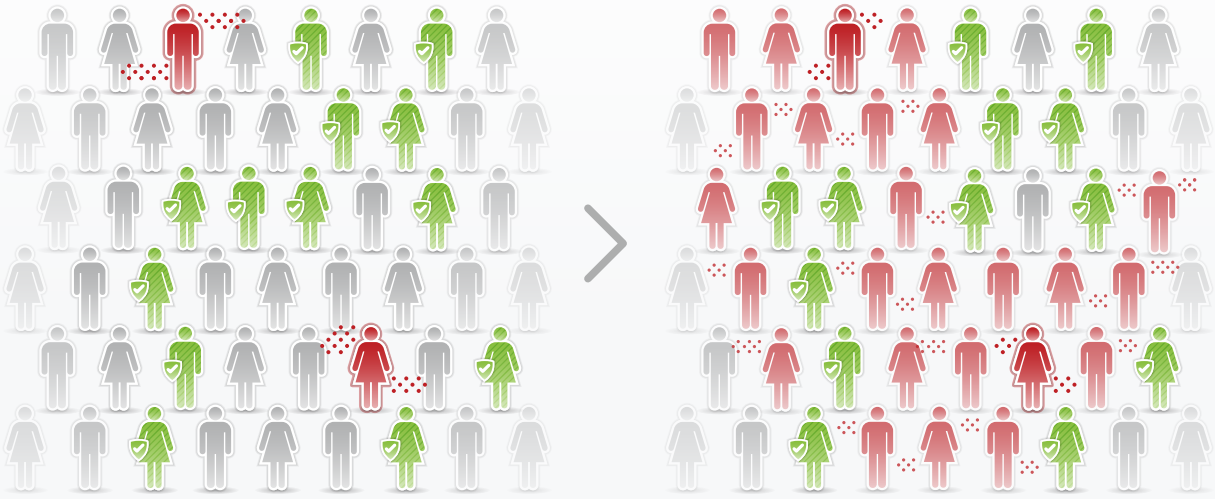
When does herd immunity take effect?

Bundeszentrale für gesundheitliche Aufklärung

BZgA

1 No herd immunity

The virus can spread among the population.

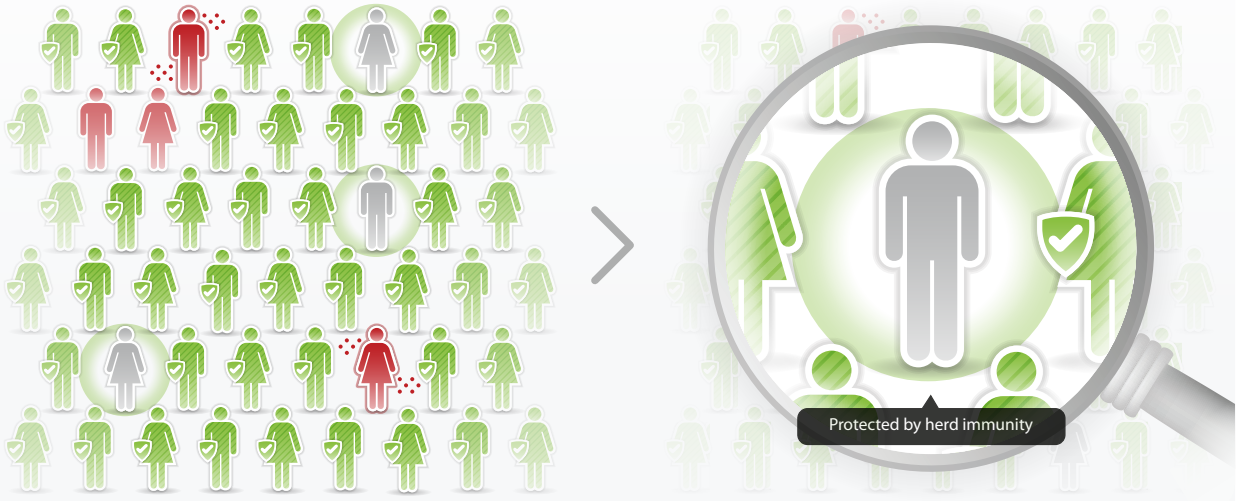


Only part of the population is protected against the virus through vaccination.

If only a few people are vaccinated, many unprotected individuals may contract the virus. The virus spreads more easily from person to person.

2 Herd immunity

Individuals who are not vaccinated are protected by the community.



If many people are vaccinated, the virus's spread is limited.

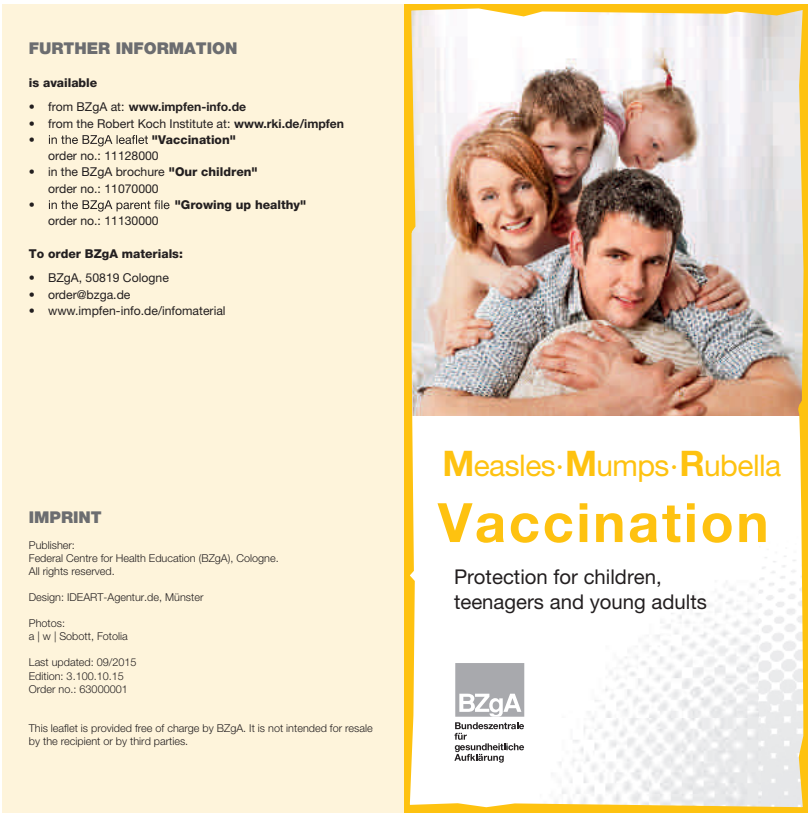
People who cannot be vaccinated are protected by the people around them who have been vaccinated. This is known as herd immunity.

Vaccinated Not vaccinated Infected Virus

Source: BZgA Cologne, 2013

Test group 5: This test group was given the specific **measles vaccination letter** which test groups 2 and 3 also received, as well as a **leaflet on the measles vaccination** from the BZgA (see *Figure 6a*). This leaflet provided objective information about the measles, mumps and rubella vaccination in children, young people and adults. As the leaflet also discussed mumps and rubella to the same extent as measles, and also provided recommendations for children and young people, the appeal to adults was less targeted and detailed in this instance than, for example, in the information material provided to test group 2 (see *Figure 6b*).

Figure 6a: Front and back of the BZgA leaflet for test group 5



FURTHER INFORMATION

is available

- from BZgA at: **www.impfen-info.de**
- from the Robert Koch Institute at: **www.rki.de/impfen**
- in the BZgA leaflet **"Vaccination"** order no.: 11128000
- in the BZgA brochure **"Our children"** order no.: 11070000
- in the BZgA parent file **"Growing up healthy"** order no.: 11130000

To order BZgA materials:

- BZgA, 50819 Cologne
- order@bzga.de
- www.impfen-info.de/infomaterial

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Measles·Mumps·Rubella

Vaccination

Protection for children, teenagers and young adults

BZgA
Bundeszentrale für gesundheitliche Aufklärung

Figure 6b: Text in the BZgA leaflet for test group 5 in which reference is made to adults

When is vaccination recommended for adults?

As more and more young adults are contracting the disease, since 2010 STIKO has recommended a booster vaccination against measles for all people born after 1970 who did not receive the vaccination during childhood or who only had one vaccination. The vaccination uses the MMR vaccine.

In particular, parents and young adults working in community facilities or in the health service should have their vaccination status checked. Individuals protected against measles will not, for example, infect infants, who cannot be vaccinated.

Test group 6: The letter for this group was drafted by the editorial team at TK (see *Figure 7*). It was written in the typical style used by TK to address customers. The letter is formulated in a more casual and succinct style and as a result lists fewer facts. It does specifically state the aim of the WHO, however, to increase the vaccination rate to 95%. This information is not included in the letters to the other test groups. No other information material was sent with this letter.

Figure 7: Letter to test group 6

Techniker Krankenkasse, 20905 Hamburg

Fachzentrum
Ambulante Leistungen
Tel. +49 (0)40 – 46 06 62 01 20
Business reference no.
V564241782
25 October 2016

The measles vaccination - are you protected?

Dear ~~customer~~,

Many people don't realise that measles is not a harmless childhood illness, as complications occur in around one in every ten cases.

Although the number of cases of measles in Germany has fallen overall in recent years, the disease is on the rise among people who have not been vaccinated. This is why, together with the World Health Organisation (WHO), we are supporting the goal of making Germany measles-free in the next few years. To achieve this, at least 95% of the population must be vaccinated.

Have you never been vaccinated against measles, or did you receive only one vaccination as a child? Or are you unsure if you've ever been vaccinated at all? If you were born after 1970, you should arrange an appointment with your GP. Make sure you take your vaccination card along with you to the appointment. The good news for you: we will cover the costs of this vaccination.

Vaccination is important for adults who have not previously had measles and are therefore not immune. Infants, who cannot be vaccinated yet, must also be protected. They are only properly protected if the people around them are too. This is what experts refer to as "herd immunity".

As more and more teenagers and young adults are contracting measles, the Standing Committee on Vaccination (STIKO), a committee of experts at the Robert Koch Institute, recommends a booster vaccination from the age of 18.

This letter was sent in cooperation with the Federal Ministry of Health.

Control group: This was made up of 15,000 TK customers who did not receive any letters. It served as a comparison for the other test groups.

The test groups differ partly in terms of the content of the informational material and partly also in terms of the quantity and type of materials provided. Informational materials as part of a randomised controlled trial allow the causal effects of the informational material in question to be identified, and the effects of the various types of informational material to be compared with each other, for example. Table 2 summarises the various informational approaches used for the test groups.

Table 2: Informational approaches in the test groups

Group	Informational approaches
Test group 1	General vaccination letter
Test group 2	Specific measles letter + leaflet
Test group 3	Specific measles letter + information sheet
Test group 4	Specific measles letter + focus on herd immunity + information sheet + graphic about herd immunity
Test group 5	Specific measles letter + general leaflet about measles, mumps and rubella
Test group 6	Letter from the health insurance provider regarding the measles vaccination
Control group	No informational approach


Polio
(Salk)
Masern

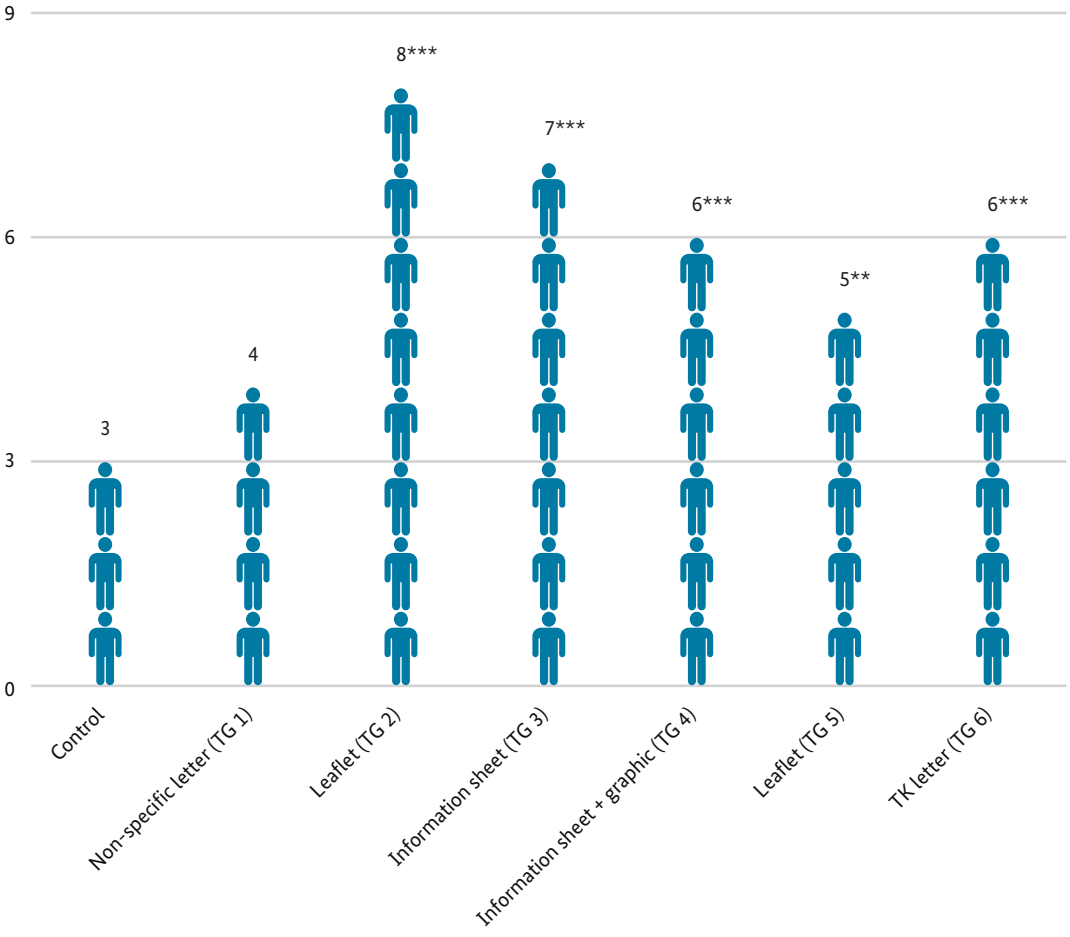
III. Results

What effect did the various letters have on knowledge and behaviour regarding vaccinations in the test groups? The comparison of the test groups with the control group shows that the number of vaccinations rose as a result of the information. There were significant differences between the groups.

Figure 8 shows the vaccination figures per 1,000 customers for the period from November 2016 to January 2017 in the various test groups. These are based on the invoice data from doctors working with TK.

When interpreting the results, it must be taken into account that, taking the known immunity rates as the basis, it can be assumed that out of all persons contacted, more than 50% were already protected against measles.[41] These individuals could not be identified and excluded, however, in order to focus the study solely on individuals with incomplete vaccination, as all of the health insurance providers delete the vaccination data of their customers after four years for data protection reasons (for more information refer to the requirements for data erasure for contracted physicians in Section 304 of Book V of the Social Code [SGB V]).

Figure 8: Number of measles vaccinations per 1,000 adults Nov. 2016 – Jan. 2017



*** p < 0.001, ** p < 0.01, * p < 0.05 [42]

Figure 8 shows that 3 in 1,000 customers from the target group were vaccinated without being addressed directly (base rate of vaccinations in the control group).

This figure increased from 3 to 7/8 customers if they received the materials for test group 2 or 3. This result is highly statistically significant. It means that TK had to send out around 200 letters with leaflets in order for one extra person to be vaccinated above the base rate (8 vaccinations versus 3 vaccinations per 1,000 customers). Along the same lines, around 250 letters were required to persuade one further person to be vaccinated in test group 3, which only received the information sheet.

Both the letter from TK and the letter containing the information sheet and graphic about herd immunity (test groups 4 and 6) increased the number of vaccina-tions from 3 to 6 per 1,000 customers. This result is also highly significant.

There was an increase of 2 vaccinations per 1,000 customers compared to the control group resulting from the letter which was sent out with the leaflet from the BZgA (test group 5).

These figures indicate that additional information beyond the letter and the information sheet, such as in test group 4 with an additional graphical explana-tion of herd immunity, does not have any demon-strable additional effect on vaccination rates.

The general vaccination letter for test group 1 did not exhibit any statistically demonstrable effect on vaccination behaviour compared to the control group. This indicates that a specific and direct approach to the topic of measles is more suitable for increasing vaccination numbers.

This is also supported by the effects observed in test groups 5 and 6. The leaflet used in test group 5 provided information about the measles vaccination in all age groups and also addressed mumps and rubella. This meant that the leaflet was geared less specifically to the target group than the other infor-mation materials. Compared to test groups 2 - 6, the leaflet resulted in the lowest increase in vaccination numbers. The letter to test group 6, on the other hand, directly addressed the customers succinctly and in TK's usual style about the measles vaccination.

Even brief information is evidently sufficient to focus customer attention on the subject of measles.

With these versions, however, it must be taken into account that test groups 2 - 6 do not differ signifi-cantly from each other in statistical terms.

Table 3: Results of binary logistic regression for the test groups

Test groups	Beta	Odds ratio	p value
TG 1 (non-specific letter)	0.15	1.2	0.23
TG 2 (leaflet)	0.91	2.5	$0.12 * 10^{-6***}$
TG 3 (information sheet)	0.83	2.3	$0.15 * 10^{-5***}$
TG 4 (information sheet + graphic)	0.68	2.0	$0.10 * 10^{-3***}$
TG 5 (leaflet)	0.54	1.7	$0.19 * 10^{-2**}$
TG 6 (TK letter)	0.71	2.0	$0.42 * 10^{-4***}$

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$ [43]

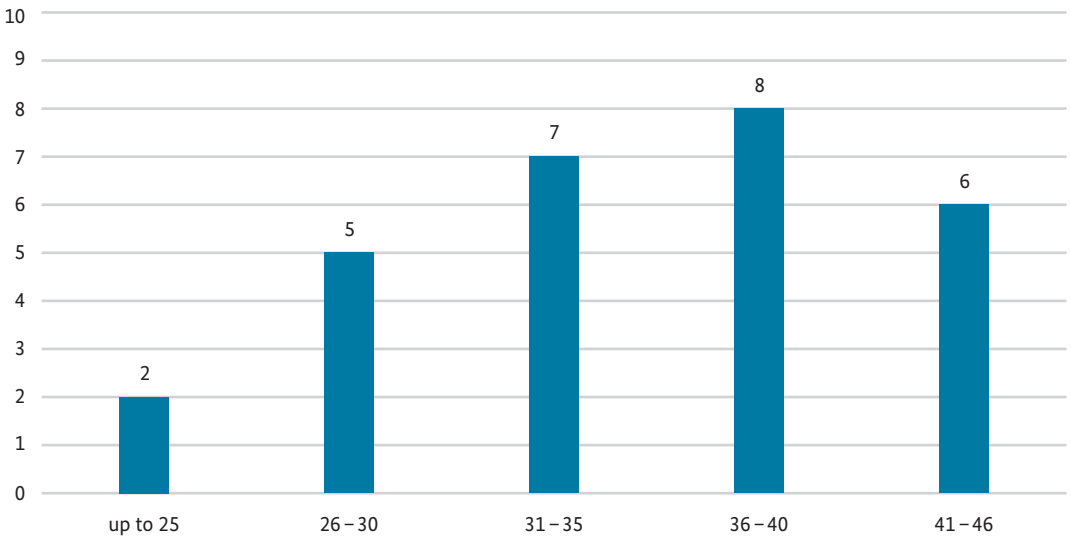
Table 3 presents the most important statistical findings with the corresponding effect sizes: Values of the regression coefficients (beta), their p values [44] and the odds ratios. The values of the odds ratios are important for interpretation. A value greater than 1 indicates a positive relationship between the letter and the measles vaccination. The value of 2.5 for test group 2, for example, means that the probability of a person who received a letter getting vaccinated was 2.5 times higher than in the control group.

With regard to the effect of the letter on the level of knowledge about the measles vaccination, no statistically valid results could be determined due to the inadequate number of participants in the online survey.

Across all groups, i.e. independent of the intervention, [45] it appears that women get themselves vaccinated 1.5 times more often than men. Whereas 5 in 1,000 men were vaccinated against measles, the figure for women was 7 in 1,000. This gender difference is significant and mirrors the findings of other studies; it also applies for other vaccinations.[46]

There were also differences in terms of the age groups. In the age group up to 25, only 2 in 1,000 adults were vaccinated (see *Figure 9*). In the age group from 36 to 40, however, 8 in 1,000 people were vaccinated. The likelihood that 36 to 40-year-olds would get vaccinated was therefore four times higher than in the age group up to 25. All age groups from the age of 26 upwards differed significantly from the age group up to 25 years.

Figure 9: Number of measles vaccinations per 1,000 adults Nov. 2016 – Jan. 2017, by age group



Summary of results

The randomised controlled trial (RCT) allowed a causal effect of information on measles vaccinations to be identified. Specifically, it was demonstrated that a direct postal communication with neutral information on measles and the measles vaccination can contribute to increasing vaccination figures in the important target group of adults born after 1970, and to closing the vaccination gap.

It makes a statistically significant, i.e. statistically demonstrable, difference whether customers were asked generally to check their vaccination status or explicit reference was made to the measles vaccination. All forms of *specific* measles information included in a direct communication to the customers through the health insurance provider demonstrably led to more vaccinations. The greatest impact resulted from a two-page leaflet in an attention-grabbing pop-art style which made recipients aware of the importance of the measles vaccination, specifically for adults (see *Figure 3b*). Vaccinations increased from 3 to 8 per 1,000 customers in the quarter. A simple and easy-to-understand information sheet without any graphics, providing factual information about the base rate and risks of measles, as well as about the advantages and disadvantages of the measles vaccine, also led to an increase in the number of vaccinations from 3 to 7 per 1,000 customers in the quarter.

In these two test groups, around 200 to 250 letters therefore had to be sent out in order for one further person to decide to receive a measles vaccination. With production and shipping costs of 50 cents per letter with a simple information sheet (test group 3), this equates to a cost of approximately EUR 125 per additional vaccination.[47]

Additional information supplementing the information sheet (graphic explaining herd immunity) or brochures using costlier production techniques resulted in no additional effectiveness compared to the simple information sheet.

End notes

[1] Federal Ministry of Health (2015). National Action Plan to Eliminate Measles and Rubella in Germany 2015 - 2020.

[2] Robert Koch Institute (2018). Aktuelle epidemiologische Situation der Masern und Röteln in Deutschland. https://www.rki.de/DE/Content/Infekt/Impfen/Praevention/elimination_04_01.html

[3] See end note 1

[4] Robert Koch Institute (2017). Empfehlungen der Ständigen Impfkommission (STIKO) am Robert Koch-Institut – 2017/2018. Epidemiological Bulletin, 24 August 2017/No. 34.

[5] See end note 1

[6] See end note 4

[7] See end note 2

[8] Ommen, O., Reckendrees, B., Seefeld, L., & Stander, S. (2014). Attitudes, Knowledge and Behaviour of the General Population in Relation to Protection from Infection, Federal Centre for Health Education, Cologne.

[9] See end note 1

[10] The term "target group" is used in the following to refer to the age group of people born between 1970 and 1998.

[11] See end note 12

[12] In accordance with convention, the designations and asterisks in the report correspond to the following: *** = very highly significant ($p < 0.001$), ** = highly significant ($p < 0.01$), * = significant ($p < 0.05$), (*) = tendentially significant ($p < 0.1$). "Significant" therefore means that the probability of error is 5% or less.

[13] http://www.bundesregierung.de/Content/DE/StatischeSeiten/Breg/wirksam-regieren/Anlagen/Download-Masernimpfung-II.html

[14] See end note 2

[15] See end note 2

[16] See end note 2

[17] See end note 2

[18] See end note 1

[19] See end note 4

[20] See end note 4

[21] See end note 8

[22] http://www.bundesregierung.de/Content/DE/StatischeSeiten/Breg/wirksam-regieren/Anlagen/Download-Masernimpfung-II.html

[23] The exclusion criteria were: Measles vaccination within the last four years, legal representative, active symptoms, data protection indicator, member has cancelled contract cover, employee insurance (MKV)

[24] Originally, 15,000 customers per test group were drawn from the TK customer database. Of these, 1,000 received a link to an online questionnaire designed to document their attitudes towards and knowledge of the measles vaccination. However, as only very few customers took part in the survey, this data could not be validly analysed due to the case numbers being too small. The analysis excluded all people who had received this link, as answering the questionnaire itself would represent an intervention. For this reason, the random sample of the test groups amounted to 14,000 people, not 15,000. The results are robust, however, if the analysis is carried out with all 15,000 of the people originally randomised into the test groups.

[25] See end note 8

[26] Silk, K. J., Atkin, C. K., & Salmon, C. T. (2011). Developing Effective Media Campaigns for Health Promotion. In T. L. Thompson, R. Parrott, & J. F. Nussbaum (Hrsg.), The Routledge Handbook of Health Communication (S. 203 – 251). New York, London: Routledge.

[27] National Association of Statutory Health Insurance Physicians (KBV) (2017): Report volume: Results of the customer survey 2017, http://www.kbv.de/html/versichertenbefragung.php. Accessed on 11/06/2018.

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[29] Edwards, A1, Elwyn, G., Covey, J., Matthews E. & Pill, R. (2001). Presenting risk information - A review of the effects of "framing" and other manipulations on patient outcomes. J Health Communication, Volume 6, 61 – 82.

[30] Jungermann, H. & Benighaus, L. (2016). Kommunikation gesundheitlicher Risiken. In: Benighaus, L., Renn, O. & Benighaus, C. (Hrsg.). Gesundheitsrisiken im gesellschaftlichen Diskurs, 35-65, Bremen: EHV academicpress.

[31] See end note 4

[32] See e.g. Nyhan, B., Reifler, J, Richey, S. & Freed, G. L. (2014). Effective messages in vaccine promotion: A randomized trial. Pediatrics, Volume 133, Number 4.

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[40] Gollwitzer, P. M. (1999). Implementation intentions. Strong effects of simple plans. American Psychologist, 54, 69 – 119.

[41] Poethko-Müller, C. & Schmitz, R. (2013). Impfstatus von Erwachsenen in Deutschland. Bundesgesundheitsblatt 56, 845 – 857

[42] See end note 12

[43] The test was one-tailed as no negative effects on vaccination behaviour were anticipated as a result of the letters.

[44] See end note 12

[45] No interaction effects could be demonstrated between the group and gender or age.

[46] See end note 41

[47] The costs of producing and sending the information sheet were calculated as follows: For production and shipping, a figure of 50 cents was used based on empirical values. In test group 3, compared to the base rate of 3 vaccinations per 1,000 customers per quarter, 4 additional customers were vaccinated. This corresponds to 1000/4 = 250 letters. Based on a per-letter cost of 50 cents, this yields a total of 250/2 = 125.

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With citizens for citizens - the *wirksam regieren* government strategy

"We want to increase the delivery and effectiveness of political projects by developing these projects more from the perspective of and with participation from citizens."

Source: coalition agreement between CDU, CSU and SPD in December 2013

The Federal Government has followed through on his goal from the coalition agreement of December 2013. The *wirksam regieren* division in the Federal Chancellery has been supporting ministries and other government agencies since 2015 in getting citizens involved in the design and continuous improvement of specific projects.

Whether law or administrative rule, administrative processes or a simple form - the state has a wide variety of options for organising society and pursuing political goals. For each of these cases, these questions need to be answered: what is the optimal design and how should the implementation look like for achieving the political goal in question?

For selected political projects, *wirksam regieren* tests alternative options for design and implementation. This is done very practically, under realistic conditions and in dialogue with citizens.

Understanding.

The first step of each project is to understand the situation and the viewpoint of all stakeholders.

To this end, and depending on the details of the project, input is collected from citizens, consumers, or users on questions such as: do the affected parties benefit in the intended manner from a proposed policy? How do citizens experience public services and where do they see potential for improvement? Are forms; applications and legal language easy to understand and clear? Is the information provided to consumers helpful?

Wirksam regieren works interdisciplinarily and builds on the latest findings of the empirical social sciences. For example, behavioural and decision sciences provide insights into how people deal with infomation or perceive processes.

Designing.

In a second step, design alternatives for a proposed policy are developed from these results.

Wherever appropriate, citizens are involved in this process of developing design alternatives. Citizens' experiences and viewpoints are thus taken into account.

Testing.

The various design options are empirically tested with a view to their actual effect, user-friendliness or clarity. Issues can be identified early on to optimize delivery and implementation.

Evaluating.

Ministries or authorities define the research question and the project scope. *Wirksam regieren* formulates and implements the research design, collects data and evaluates it.

The results become part of the political process and decision-making in the ministries and government agencies.

The benefits of this approach: the effectiveness of political projects can be optimised from the citizens' point of view: laws and programmes become more targeted. Information is made clearer. Forms, processes and legal language become simpler. Unnecessary bureaucracy is avoided and taxpayers' money is saved.

By incorporating scientific expertise along with citizens' ideas and viewpoints better solutions for an effective policy making process can be achieved.

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Direct link to the *wirksam regieren* site:
https://www.bundesregierung.de/breg-en/issues/wirksam-regieren-with-citizens-for-citizens

"Information on the measles vaccination" report & reference materials:
https://www.bundesregierung.de/breg-en/issues/wirksam-regieren-with-citizens-for-citizens/topics/measles-vaccination-protection-for-everyone-323382

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