MASTER THESIS – HEALTH SCIENCES

Appendices

Entrepreneurship as working mechanism of performance based financing

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Appendices

APPENDIX I: Questionnaire

APPENDIX II: Questionnaire Rationale

From framework to questionnaire

In another document, the framework for diffusion of innovations is discussed. However, from framework to questionnaire some choices have to be made. What to include, what not to include, how to ask, and why? First the final goal will briefly be discussed, leading to the rationale of including all key factors in diffusion. Then it will be explained how every key factor will be measured and why. Finally, this will result in the methodology rationale, including the sample strategy and analysis strategy.

As was explained in the problem description, this research aims to contribute in overcoming two different research gaps in the research to PBF. The first is to pay attention to how PBF changes not only the output, but how it changes the process. It is quite remarkable that this has not been investigated before. When you get insight in the process of PBF instead of only to outcome, better appraisal can be made for other countries whether PBF is likely to work or not. Also it can help the Rwandan government to adapt policy upon findings, e.g. by implementing PBF in other areas other than health care (like education).

The second identified gap is the possible spatial differences that influence the success of PBF. So far no research has been done to the influence of the context in which PBF is embedded. This context consists, although not exclusively, of spatial factors. For example because every province has a different assisting NGO, and also culture among provinces and/or districts differs, differences in both process and outcome of PBF can be expected.

To overcome both gaps, this research mainly focuses on process changes of PBF with paying extra attention to spatial differences. To include both process changes and spatial differences, there is chosen to look to the diffusion of process changes. Not only underlying spatial factors can be investigated in this way, also the diffusion itself is a spatial process. Process changes can be very small, but these are more difficult to measure. Therefore, there is chosen to investigate larger process changes, regarded to be innovations. With choosing this, the theoretical framework of diffusion of innovation can be applied, giving some grip on how to research and which factors possibly play a role.

This research also aims to be of a help for the Rwandan government, to give clues how to spread effectively the desired initiatives. For that reason, usefulness of the measured variables for the government also played a role in the choice of variables. Also, in choosing which attributes and characteristics to consider and which not, possible spatial relevant information can be decisive in (not) implementing it in the data collection.

Intentionally, it was the idea to choose some innovations on beforehand and to look to the diffusion pattern of these. However, identifying the innovations turned out to be more difficult than expected, since the successful strategies were already adopted as government strategy. For that reason, the approach has slightly changed. Therefore, first it will be tried to identify which changes the health center has made to be able to achieve the set targets by the government. Then, from there, the framework of diffusion of innovation will be used.

The key factors in diffusion of innovations

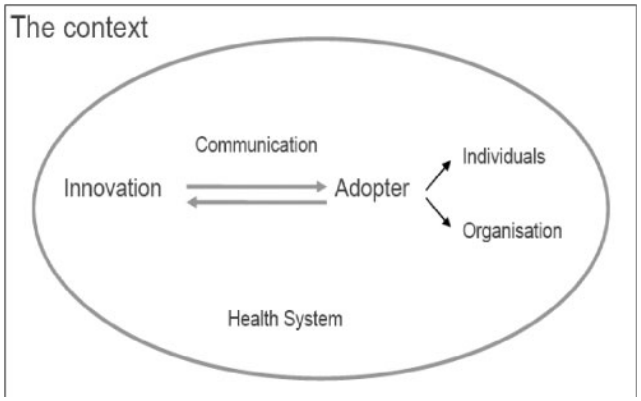


Figure 1: A framework for analyzing the diffusion of complex innovations in health systems. Adopted from Atun et al.

In the diffusion of innovation research, four key factors are identified to play a role, shown in Figure 1 and discussed in more detail in the theoretical framework. For this research, all four key factors of the diffusion of an innovation are taken in account. All have an important role in the diffusion process and there is often interplay between different factors, making it difficult to investigate only one of the factors. Furthermore, it would do no justice to the real situation to isolate only one. For that reason there is chosen for a comprehensive approach in which all four key factors have a part. A consequence of this is that all factors cannot be studied into that much dept as would have been the case when they were studied separately.

Key factor 1: Innovation

First, there is the key factor of the innovation itself. Two strategies are used for this key factor. The first strategy is to identify different innovations, are they present or not? Since it is not exactly known what innovations are present, questions are open, to make an inventory of all innovations that are present. Consequence of this is, unfortunately, that it is not possible to be sure whether there are health centers which actually do have the innovation, but it is only not listed. However, it is tried to prevent this by asking quite specific questions, targeted for different kinds of care.

Then, for one innovation, more details are asked. Because it is not known with what innovations the respondent will come up, it is also very difficult to choose an innovation on beforehand. Therefore, this is not done. However, to direct the respondent to the innovations most of interest (and to increase the change of picking innovations in the same domain) they are asked to choose one which (preferably) meets the criteria to be introduced after 2005, not being a government initiative, being characteristic for this health center and in the domain of mother and child care. Since the filling-in of the questionnaire will be accompanied with a presentation and some supervision, it is thought that this should work.

First is asked when the innovation has been implemented. Secondly, the innovation attributes are studied. Different attributes are measured, both to investigate whether there is difference in the perceiving of an innovation and whether the attributes influence the diffusion. The former is of interest, because of possible spatial effects that can be seen, the latter is interesting for possible policy implications.

Thus for the analysis, it has to be tested whether there are regional differences in adoption of different innovations, and the correlations with certain other variables (like health center characteristics, or communication channels). Attributes of the innovations are identified by Rogers et al to be relative advantage, compatibility, complexity, observability and trialability. Although not an attribute of the innovation, also uncertainty will be measured, since this is also important for adopting, and it is spatially a very interesting variable, because there could be large differences in how well they are known with the innovation (because of contagious spread from centers). The perceived attributes will be mapped to see whether there are spatial differences and effects and if so, it will be tried to analyze how these affect the diffusion.

Asking directly to these attributes will not work, as everyone (can) have different interpretations of these concepts. For that reason, every of these attributes is measured with derivatives of the concept, applicable to the specific situation, in the form of statements on which can be agreed, disagreed or neutral (3-point-scale). There is chosen for a 3-point scale because in the testing it turned out that 5 options were not understood, making it too complicated. This leaves less room for nuances, but is necessary to ensure a good understanding of the questions.

To measure the relative advantage a distinction can be made to advantage to the health center and advantage to the population (and thus the government). For health centers, the most important advantage is expected to be the raising of PBF money. Other reasons can be the improvement of image of the health center. Because also government has influence on what strategies health centers (should) adopt, also the relative advantage for government is included. This is done by asking to the increase in quantity and quality of care (quantity is expressed in number of patients served).

Measuring complexity, in literature is also labeled as ease-to-use, is somewhat more difficult to measure. Mainly it is the question if it results in many additional routines (e.g. the administration to deal with this).

For observability this is how direct they see the initiative related with extra PBF money. For trialability, it is asked whether it has to be introduced immediately, or with some trying before.

Regarding the compatibility, there are a few issues I expected to play a role. First, is there sufficient capacity to deal with the changes (and possibly more patients)? Can it be integrated in the working methods, or does it have to be changed? And how much changes are there for the personnel?

Regarding the uncertainty, there are many different aspects on which uncertainty could be about. To cover uncertainty on output, there is asked if the results from the innovation are known from many other health centers. For the structure, it is asked whether it was known what changes were needed.

The final questions in the questionnaire are related to the innovation's attributes as is shown in Table 1.

Attribute	Questions
Uncertainty	3.1.1, 3.1.2
Trialability	3.1.3
Relative advantage	3.2, 3.3.1, 3.11.1 – 3.11.5

Observability	3.2, 3.7.6
Compatibility	3.3.4, 3.3.5, 3.7.2, 3.7.3
Complexity	3.7.1, 3.7.4, 3.7.5

Key factor 2: Innovator

Second, there are the innovator's characteristics. Personal and organizational differences can play an important role in whether or not an innovation is adopted. Underlining the importance of this factor, are the different adopter-categories that have been described, being innovators, early adopter, early majority, late majority and late minority. However, for this research it is of less importance which health center exactly belongs to what category, since the focus is more on spatial diffusion. Also, opinions in literature on the use of these categories differ (Greenhalgh, 2004). But it is interesting which characteristics of the health center have an influence on the adoption/rejection and time of adoption. This could be used by government to pay special attention to certain health centers, when implementing new policies. Also the hierarchy of the health centers is very interesting, as this can have a large role in the diffusion.

You can measure on different innovator's levels. This can be an individual to adopt, a team or an organization (Anderson2004, Lansisalmi2006). Although probably individuals will play a role within the adoption in the health centers, more focus will be on the organization level, as on this level characteristics are more open to objectification and thus better to adapt policies on. Anderson et al identifies 5 key components on the organizational level, being structure, strategy, size, resources and culture. These are used, although subdivided further to measurable items, adapted from Anderson, Wejnert and sometimes also on own insight.

The key components on organizational level are still quite broad. To further specify it to measurable components, also applicable for health centers, items, adapted from Anderson, Wejnert and some based on own insight are used.

In **structure**, most health centers are quite similar. They are established for the same, well-defined, targets, only in different regions. Also there composition is in big lines the same, as captured by the ministry of health. For that reasons, differences in specialization, centralization, formalization and complexity are thought to be limited. Still, to cover this item, there is questioned which services are offered. This gives an idea of possible differences in structures, although it is quite limited.

For measuring **strategy**, an important question is to what extent the health centers can make the strategy themselves. Therefore, it is asked if the personnel has a voice in the policy and whether they are enterprising. However, since this is more focused on the process of making strategy (and thus closely related with culture), there is also a question inserted on which services their main focus is.

Size is measured in three different ways. There is asked for the size of the catchment population, there is asked for the number of skilled personnel, and there is asked for the number of patients that is treated monthly. The main interest is to get some indication of size, exact numbers are not of many additional value.

Regarding **resources**, three components can be identified. There is the resource of money, of personnel and of instruments. Since the resource of money is reliable, there is only asked via which channels they receive money (only government or also NGO's/faith-based organizations). Via the

ministry it is tried to get insight in the funding of the health centers. Regarding the personnel resources, there is asked to the functions present, the level of education and motivation. Although it is not possible to get insight in all instrumental resources, to get an impression of the general situation, there is asked for sterilization equipment and supply of medicines.

The organizational **culture** is quite difficult to measure. However, it is tried to get insight into this, by giving statements, just as for the innovation attributes. Motivation, leadership, entrepreneurship and how the supervisor sees his own function is measured (both how he sees it himself as what the health center expects).

In the case of health centers, another important factor is **accessibility**. This will not be questioned (as it consists of too many items), but will be done using Kernel techniques in ArcGIS.

To get insight in the existing **hierarchy**, there are two approaches. There is tried to get insight in the competitive position of the health center (by asking whether people are coming from far, or going to other health centers). And there is asked which health centers serve as an example, or to which health centers this HC is an example. To also get insight in the hierarchy during communication moments, there is asked which people have input during this communication and who is leading the meetings.

For this research these components are measured in all health centers included in the sample. Questions are directed to the supervisors (or heads) of health centers. This has different reasons. First, a supervisor has an overview of the health center and can also compare put the results of a health center in perspective (as they often supervise more than 1 health center). Second, there is an argument of convenience; they are high educated, thus literate, and easy to reach through the district hospitals. Thirdly, I expect them to have an important role in the introduction of innovations, both as communication channel and in making the decision.

For the analysis, the different characteristics will be correlated with the (time of) adoption. Also it will be analyzed whether there can be seen spatial clusters in some of the characteristics, serving as useful information for policy making.

Characteristic	Questions
Structure	1.1,
Strategy	4.2, 4.6.3, 4.7.1, 4.7.2 (2.1 – 2.5)
Size	1.2, 1.3
Resources	4.1, 4.3, 4.4, 4.5, 4.7.3, 4.7.7, 4.8
Culture	4.6.1, 4.6.2, 4.7.4, 4.7.5, 4.7.6
Hierarchy	4.12-4.13

Key factor 3: Environment

When looking to Figure 1, both the context and the health system can be considered to be the environment. The scale-wise introduction of PBF is an interesting difference in the health system between areas. It is an excellent opportunity to evaluate whether the assumption of PBF driving to innovate is indeed correct. Therefore, there is a comparison made between the regions in which PBF has been introduced in Phase 0 (Kigali), Phase I and Phase II.

Other environmental factors that could play a role are partly implemented in the questionnaire, but are also partly relying on other data sources (mainly from CGIS and national institute of statistics of Rwanda → NIoSR). Four main categories are identified by Wejnert 2002 et al, being political conditions, societal culture, infrastructural problems and competition. Competition is tried to grasp in the questionnaire as well as infrastructural problems. Political conditions are implemented by asking how the supervisor sees his own role. For societal culture, it is tried to use data from NIoSR.

Of course there are also some general contextual settings, similar through all the country. But exactly for this reason, that there are no or very few differences, it investigating their influence demands a different approach and is therefore not done here.

By analyzing clustering of the diffusion of innovation, it will be investigated whether there are spatial components that underlie this clustering.

Characteristic	Questions
Political conditions	3.3.3, 4.19.1
Societal culture	4.9.1 – 4.9.3
Infrastructural problems	1.6
Competition	4.10-4.11, 3.3.2
Other	1.4, 1.5

Key factor 4: Communication

Communication plays an important role in how an innovation diffuses, emphasized by the fact that the diffusion in space as described by Hägerstrand almost solely depended on the communication. For that reason, also communication channels have to be included in the research. There are two ways applied in the questionnaire to investigate the communication.

First, the existing communication channels are tried to be mapped, by asking how often there are meetings etc. This is something that could differ between regions or districts and could then perhaps be linked to a specific diffusion pattern. There is asked for meetings within the health center, within the district and between districts. To further specify, it is asked which meeting is perceived to be most important for diffusion. For that meeting it is asked into more detail, who are present, who has input, and who leads those meetings.

Second, there is asked from which channels the supervisors became aware of the innovation. In this way, it is tested what channels have a main influence in the diffusion. For this, more specific is asked from who the information exactly is received, so that important channels are even better identified.

To see whether the communication channels are mainly locally or more hierarchical, analyzing the diffusion pattern on contagion and hierarchy will be performed.

Characteristic	Questions
Frequency	4.14.1-4.14.7
Hierarchy	4.17, 4.18.1-4.18.5
Culture	4.17, 4.18.1-4.18.5
Importance of channel	3.6, 4.15 (3.1.1-3.1.2)
Other	

From questionnaire back to framework

Question 1.1

Rationale

This question gives an overview of what the health centers offer. The categories are the same as they were in the SPA 2007, being the most important. This list is not exhaustive, but on purpose the category other is not added, since this would lead to a long list. The basic activities of interest, also regarding the PBF are included.

In SPSS

Every variable will be inserted seperately, after that it will be divided into a few categories (depending on what variation is most seen).

Question 1.2

Rationale

Basically to get an insight in the number of staff and their education. The groups are according to the Ministry of Health, although doctors in most cases are not part of the personnel. However, there are health centers in which they are having doctors.

In SPSS

A variable for total number of personnel and a variable for the education-level (low-medium-high) will be derived from this question.

Question 1.3

Rationale

Mainly to give insight in size of the number of patients treated. This becomes more interesting when looking whether this is in proportion to the staff size.

In SPSS

Give the number, but also make a variable about the ratio staff-size and patients treated.

Question 1.4

Rationale

During an orienting meeting with some people involved in the introduction of PBF, the mutuelles could have a large influence on the PBF and also the success of health centers, as an unsuccessful Mutuelles leads to access barriers. To control whether this is the case, this variable is inserted.

Question 1.5

Rationale

This question is mainly to control whether health centers indeed use the administrative boundaries, or that there are many difference. Also based on the sectors, the catchment population can be estimated (unfortunately only with data from the Census from 2002).

Question 1.6

Rationale

To find if there are any problems in accessibility this question is added. However, for further accessibility calculations, ArcGIS will be used.

Section 2, questions 1-5

Rationale

To make an inventory of all the present innovations, open questions regarding the different PBF targets are given. These will be gathered in Excel and be grouped. Based on this, a code will be developed, to also bring them into SPSS.

Question 2.7

For the timeline, there are two contradictory considerations. First, to see the diffusion pattern, you want to have a high time resolution. However, innovations could be a few years old, making it different to remember the exact moment. Therefore there is chosen for a middle course, by asking for the quarter. To keep the questionnaire well-organized, not all options are listed. However, an open question would probably require more thinking. Therefore, a timeline is given in which the period of introduction can be marked.

Question 3.1, 3.7 & 3.11

Rationale

Only 3 categories since during testing it turned out that a five-point scale was not working. This questions are used to ask some more about the innovation attributes. Further in this document, there will be explained how to work back from these statements to the attributes.

In SPSS

Just enter the score (1, 2 or 3).

Question 3.2 & 3.3

Rationale

To see what has had an influence on the choice for the strategy, and also what has been real reasons to choose for it. Gives some insight in how (from which perspective) health centers are thinking: only PBF, or also from patient perspective?

Question 3.4, 3.8, 3.12, 3.13, 4.5, 4.8 & 4.20

Rationale

The questionnaire is directed to doctors. This means, quite high educated people. What I understood from people here, this means that they should be made able to give their opinion. That is the reason that there are so many questions which are open, mainly for additional comments. These comments will be put in Excel and if useful, also be tried to integrate in SPSS.

Question 3.5, 3.6, 3.9, 3.10

Tried to be as exhaustive as possible with the options, but item 'other' added to ensure the exhaustiveness.

Innovation's attributes

Attribute	Questions
Uncertainty	3.1.1, 3.1.2
Trialability	3.1.3
Relative advantage	3.2, 3.3.1, 3.3.2, 3.11.1 – 3.11.5
Observability	3.2, 3.7.6
Compatibility	3.3.4, 3.3.5, 3.7.2, 3.7.3
Complexity	3.7.1, 3.7.4, 3.7.5

For the different attributes it will be tried to score them between 1 and 10 (or between 2 – 6?). In general the approach will be like this:

- Test for each variable whether there is variability between respondents and between innovations
- Test whether the different questions are corresponding with each other
- Some interim conclusions based on these tests
- Aggregate the variables to one (or at least limited number of) score for each indicator

Uncertainty

For calculating uncertainty, it will first be checked whether there is difference in answers (just by describing statistics). When there is not much difference, there will be two things concluded. Namely, that uncertainty was quite similar (high or low) for all innovations, and that questions were not sensitive enough to find differences in this. When there are differences, then both questions will be summed (Disagree = 1, Neutral = 2 and Agree = 3). Then test whether it can then be correlated to certain innovations.

Implementation

When aggregating the different variables to the indicators, the missing values tend to become a problem. There are different possibilities to deal with this, all having disadvantages. One of the options is to just make the missing values no part of the calculations. This however leads to high distortion of the data and therefore not really an option.

One of the two better possibilities are to take the mean answer as a value for these missing values. Although not entirely reliable, the effect will be that it brings the data closer together. For that reason it will become more difficult to proof hypothesizes. However, if they are proven, it is more reliable.

The second option is to look to take the mean of the other questions about the same indicator the respondent has given. This takes the individual better into account, but will lead to more spread, which might not be reliable.

For that reason I choose for the first possibility as this one will not lead to wrong acceptation of H1-hypothesis.

Regarding the uncertainty, two variables are just added with an equal weight to both. For a first analysis of the data this should do, when looking more in detail, some variation in this could be considered.

Trialablility

Also for this variable, test whether there is much difference in answers. If not, conclusion about general trialability. If so, just mention the score.

Implementation
The same, just mention the score

Relative advantage

For the relative advantage there are some overlapping questions and also different areas of relative advantage can be identified. The advantage can directly be related to monetary advantage, but also to increase in quality and/or quantity of care. If the advantage has really been the decisive reason to implement the strategy (question 3.2 and 3.3) this will be additional to question 3.11, if crossed.

The high costs (3.11.2) are meant to counterbalance the advantage (both monetary as improvement of care). For 3.11 there is checked whether there is sufficient difference based on which some interim-conclusions are made. For calculating the score there is the formula 3.11.(1,3,4,5) – 3.11.2 + 3.2 + 3.3.

Implementation
Two indicators are created. Relative advantage for care and relative advantage for the Health center. For care, the variables about improvement in quality and quantity of care and reaching more people (3.2.1, 3.2.2, 3.2.7, 3.11.4 and 3.11.5) are used. To make sure that question 3.2 has an equal influence, these scores are multiplied by 2 (either 1 or 0).

For relative advantage for the health centers the PBF money and image are involved (3.2.3, 3.2.6, 3.3.1, 3.3.2 3.11.1, 3.11.2 and 3.11.3). Since the costs are negative (3.11.2) for the relative advantage, these are subtracted.

Observability

3.7.6 is for this the main question, based on which the score is decided. For additional 'points' 3.2 can be added to this.

Implementation
As before, 3.7.6 is used and 3.2.5 is added to this (multiplied by 2)

Compatibility

Again, the items from question 3.7 will be regarded to be most important. However, to see whether it has really played a role in the decision process, also items from question 3.3 are taken into account. Items 3.7.2 and 3.7.3 are equally weighted.

Implementation
Items 3.3.4, 3.3.5, 3.7.2 and 3.7.3 are all added and equally weighed.

Complexity

Although the questions cover different aspects of the complexity, the scores will just be added to each other.

Implementation

3.7.1, 3.7.4 and 3.7.5 are all added with equal weight.

Question 4.1

Mainly to get some insight in possible affiliations with other organizations, and also to get insight in whether they possible have more money compared to other health centers.

Question 4.2

To see if they have a certain focus. Does this match with the strategies they developed?

Question 4.3&4.4

Even though it is difficult to get insight in all material resources, some important variables, varying from basic to 'luxury' are included.

Question 4.6&4.7&4.9

To get insight in the personnel and culture of health center, they are asked to score different items in a 3-point scale. It is expected that the head of the Health center has a big voice in the health center. For that reason, characteristics of the head are asked more into depth.

Question 4.10-4.13

The health centers which have the same supervising hospital are included, as there most communication is expected. However, there is also room for other health centers.

Question 4.18-4.19

These question were first a five-point scale. However, this did not lead to enough deviation. To really be able to rank them, there is chosen for the approach that they have to rank them themselves.

Innovator's characteristics

Characteristic	Questions
Structure	1.1,
Strategy	4.2, 4.6.3, 4.7.1, 4.7.2 (2.1 – 2.5)
Size	1.2, 1.3
Resources	4.1, 4.3, 4.4, 4.5, 4.7.3, 4.7.7, 4.8, 4.7.4, 1.2, 4.6.1
Culture	4.6.2, 4.7.5, 4.7.6, 4.9.4, 4.9.5
Hierarchy	4.12-4.13

For the innovators characteristics it would not do justice to the indicators to just give a score to them. For example, how can you score culture with points? It makes more sense to define certain categories in which health centers could fall (e.g. cooperative culture or hierarchical culture) to which they could score.

Structure

Expected is that there are not much differences in what the health centers offer. Probably the health centers can be grouped in a few groups: offering all; offering all but one (perhaps religious); offering limited services.

Implementation
All different items are summed.

Strategy

For the strategy, a score will be given to how much 'space' there is for strategy-making. There is not looked to what exact strategies are present, but more whether they can be present. For the variables there is checked whether they differ between health centers (and whether there is correlation with the cluster they are in). Do they have a focus? Entrepreneurialism of staff and risk-taking are aggregated to a score between 3-9. Then for the number of strategies in section 2 a score is given between 1-5. These two will be averaged and then if there is a certain focus on services one point will be added.

Implementation
Calculated how much space there is for innovation. This is: do they have a focus on certain areas? Entrepreneurialism of staff and head of health center, and how much risk they take.

Size

Size of personnel and patients is interesting, but also what is the ratio between the two (although that is perhaps more interesting for the strategy). I expect there to be a relation between the two, but there can be exceptions. Based on the results, I just choose one of the two variables to do the further analysis with (which personnel group corresponds best with # of patients treated).

Implementation
Unfortunately, something went wrong with the collection of the question about the number of patients treated. For that reason, for the size only the number of personnel is calculated (number of A1, A2 nurses, lab technicians and doctors).

Resources

For the resources there are mainly three groups. For instrumentation, based on what is seen in most health centers a score is given on the different instrumentation (on which many difference is seen, scores will be based).

For the personnel what plays a role is the motivation, education level and involvement. Education level is known from question 1.2, motivation of staff and head is from question 4.6 & 4.7. This will be aggregated to one score.

For the financial resources it depends on what is available at the Ministry of Health (MoH). This will influence what role question 4.1 will play.

Implementation

Split in personnel (motivation, involvement and education).

Culture

For the culture, three categories will be created. There will be a culture of a strong head of the health center, without much room for supervisor and personnel. Then there is a culture in which the personnel has a large role, only assisted/led by the head and also not much of a role for the supervisor. And there is the culture in which the health center demands all initiative from the supervisor and is not taking own initiatives.

Hierarchy

With the questions 4.12 and 4.13 (and also a bit from 4.10 and 4.11) some hierarchy can be seen. Probably for this, first the data has to be inserted in ArcGIS, not yet sure how to deal with this. Hope to see that many health centers give the same health center as example. Really analyzing within each cluster. (can also give insight in opinion leadership)

Other characteristics

Perhaps there can, with looking at how much a health center differs in its opinion on an innovation from other health centers, be estimated whether it is an early adoptor, late majority etc.

Environment characteristics

For analyzing environmental characteristics, it will be a bit more difficult. There is some data available from secondary sources, however, for some this is only on province-level (also some on district and even sector-level). For the rest, for all other characteristics it will be looked whether there is clear clustering in areas. This could also indicate the presence or relation with environmental characteristics.

Characteristic	Questions
Political conditions	3.3.3, 4.19.1
Societal culture	4.9.1 – 4.9.3
Infrastructural problems	1.6
Competition	4.10-4.11, 3.3.2
Other	1.4, 1.5

To what extent does the MoH influence the strategies.

For the political conditions, there will be looked directly to questions 3.3.3 and 4.19.1. For some questions about culture and strategy, there will be looked whether they are clustered for hospitals or areas. In that case, these will also be regarded to attribute to political conditions.

For societal culture a similar approach will be used.

For infrastructural problems, question 1.6 will play a role + in ArcGIS some calculations will be made.

For environment it is also interesting to investigate whether their choice of strategies (e.g. child immunization or antenatal care) shows relation with environment characteristics, that are underlying. This are other categories than included in the framework, but certainly can play a role in the choice for certain adoptions (merely by being more compatible for that region).

APPENDIX III: Interview

Interview

Additional documents needed:

1. INFORMED CONSENT FORM (2x)
2. QUESTIONNAIRE OUTLINE

Introduction

The National University of Rwanda, School of public health is conducting research to the innovations and the diffusion of these innovations thanks to the PBF-system. This interview aims to learn about initiatives that are introduced in health centers, to improve quantity and quality of health care. Also it will learn us on how the introduction of PBF has contributed to the development and spread of these initiatives. Main focus will be on through what main factors influencing diffusion and adoption of the innovations, e.g. communication channels.

AIM: Aim is to explore which innovations are present, the factors influencing adoption and diffusion, also interpret and structure meaning attached to innovation, and diffusion process derived from perception of informants

Questions are in different areas. Some existing innovations in health centers will be discussed. Also you will be asked if you know of any innovations in different areas.
Then, a few of these innovations will be selected to discuss more into depth. Items that will be discussed are the innovation attributes, health center and regional characteristics influencing the adoption and through which communication channels they spread.
Your answers will be treated confidential; your name will never be used in the presentation of the results.
If you agree to participate with the research, please sign the informed consent.

Part 1: General information

What is your function?

How long are you in this function?

What is your role in the health care system?

What is your role regarding performance-based financing?

What is your vision on performance-based financing?

- Benefits
- Disadvantages

Part 2: Presence of innovations

There are some government initiatives, which could be seen as innovations.

1. *To ensure that pregnant woman complete the four prenatal visits different strategies can be used. One of the possible strategies is to provide the delivery for free, when a pregnant woman has completed the four prenatal visits.*
2. To ensure that children attend to all five vaccination rounds, different strategies can be used. One of the strategies is to provide them with a mosquito net after the fifth time.
3. *To reach also people in the far-located areas or areas with other problems, different strategies can be used. One of the strategies is to travel with some staff to those communities, e.g. to provide them with vaccinations and VCT.*
4. To inform people on health different strategies can be used. One of the strategies is to give presentations on meetings after the Umganda, e.g. on Tuberculosis.
5. To improve the health center based on feedback from communities different strategies can be used. One of the strategies is to meet with the Health Community Workers from each community to discuss possible improvements.
6. *To ensure availability of drugs and other inventory, different strategies can be used. One of the strategies is to use a stock form, to monitor the drugs on on a daily basis.*
7. To ensure the quality of care, different strategies can be used. One of the strategies is to have a team for quality improvement, which evaluates every month on possible improvements
8. One of the governments' initiatives to improve the child health service is the PCIME, in which care is combined.

However, I am most interested in innovations that have started only in a few health centers (and then maybe later spread out over the rest of the country.

Therefore, I would like to list what developments you are aware of in health centers. Preferably, they are initiatives which are not (yet) a government initiative and not too old.

- Most interested in new innovations, not (yet) government initiatives
- Also interested in 'old' innovations, which were not added to the government initiatives.

First category is the **amenities for people**.

- By what ways are people attracted to come to health centers for e.g. preventive or promotional activities?
    - Are they provided with some (non)monetary compensation?
    - Are people going into the community to let them know?
- What has been the last 'structural' improvement of the health center
    - Electricity
    - Buildings
    - Running water
    - Etc

Second category is **responsiveness to patient preferences**

- What are strategies to involve community?
    - Are there meetings with representatives from community?
        - How often?
        - How many representatives? Chosen by community?
    - Other ways to involve them?
- Is patient satisfaction being evaluated?
    - Regularly?
    - With forms or questions?
- What is done with the feedback provided by patients and community
    - Practical examples of specific changes

Third category is **Efficiency**

- How is inventory managed?
    - Ordered when finished?
    - You know at every time how much is left?
    - Are there improvements in this management
    - Are vaccines etc. properly managed?
- Is there something like a facility management system?
- Is attention paid to how do things more efficiently
- Are responsibilities/tasks recently been rearranged?

Fourth category is **cost-effectiveness**

- Do you have any insight in which tasks cost money (relative to what there is paid for from government) and which tasks makes money? Do you adapt to this
- Are there improvements you would like to do, but that are too expensive to do?

Fifth category is **technical performance** regarding child and maternal health

- How do you make sure pregnant women visit more than once?
- How do you make sure the children come for their vaccination?
- What are recent changes to improve the health care regarding mother and/or child?

Sixth, seventh & eight: **interpersonal relationship, access and equity**

Last category is **Other**

- Are there for example things combined (like when somebody comes, also offer him HIV/ or weigh the child?)
- Other things that have been implemented the last 4 years?
- The bonus because of PBF, how has it changed things in the HC?

Table 1 Quantity indicators, quality criteria, quality indicators and fees (US$1 = 555 Rwandan francs, FRW)

Services	Quantity indicator *X*	Quality criteria	Quality indicator *Y*	Fee in FRW	Subsidy *Y* × fee
Curative consultations	Total of new cases during the month	1. Entry (=main complaint or symptom) and exit (=diagnosis) of clinical algorithm registered in the consultation register 2. Treatment coherent with diagnosis (as indicated in the algorithms)	Total of new cases during the month fulfilling the quality criteria	100	Y × 100
Antenatal consultations	Total of cases (old and new) during the month	1. Antenatal record correctly and completely filled out in twofold: one for the mother and one to be correctly classified in the health centre 2. A written invitation has been sent within a week after noticed absence for a consultation	Total of cases (old and new) during the month fulfilling the quality criteria	100	Y × 100
Growth monitoring consultations	All children of >1 year and <5 years present at consultation	1. Copy of consultation record correctly and completely filled out and correctly classified in the health centre 2. Balance in good working condition 3. Growth curve correctly completed 4. A written invitation has been sent within a week after noticed absence for a consultation	All children of >1 year and <5 years present at consultation fulfilling the quality criteria	100	Y × 100
Family planning consultations	Total of women protected at the end of the month	FP record correctly and completely filled out and correctly classified	Total of women protected at the end of the month fulfilling the quality criteria	100	Y × 100
Deliveries	Assisted deliveries at the health centre or correctly transferred for delivery at the District Hospital	1. Partogram correctly and completely filled out 2. Mother and child alive (if delivery in health centre)	Assisted deliveries at the health centre fulfilling the quality criteria or correctly transferred for delivery at the district hospital	2000	Y × 2000
Vaccinations	Total of children ≤1 year completely vaccinated during the month	1. Temperature of refrigerator within required limits 2. If the refrigerator is running on petrol, a 5-l reserve should be permanently present at the health centre 3. Copy of the vaccination record correctly and completely filled out is correctly classified in the health centre 4. A written invitation has been sent within a week after noticed absence for a consultation 5. Vitamin A has been correctly distributed	Total of children ≤1 year completely vaccinated during the month fulfilling the quality criteria	1000	Y × 1000
Total amount of subsidy					∑Y × fee

Give a short summary of the listed innovations. Any other?

Part 2: Specific innovations

Origins of innovation

Source of introduction

- Coincidence that that's the source?
- Correlation with characteristics of innovation?

Why introduced

How introduced (Decision & implementation)

Opinion on innovation

Diffusion of innovation

See also document QUESTIONNAIRE OUTLINE for further details.

Attributes of innovation

- Relative advantage
- Compatibility
- Complexity
- Observability
- Trialability
- Uncertainty
- Familiarity
- Suitable for all health centers?

Communication channels

Which communication channels are important for this and why?

- Hierarchy in communication
- Frequency in communication
- Pattern in communication

Health center characteristics

Which health center characteristics play a role in adoption?

- Structure
- Strategy
- Size
    - Catchment population
    - Personnel
- Culture
    - Leadership
    - Motivation
    - Etc.
- Accessibility
- Hierarchy
- Resources

  From other instances (+ instrumental/personnel influence)
- Relation with other health centers

Environmental characteristics

- PBF phase
- Political conditions
    - Government
- Economic
- Institutional conditions
- Societal conditions
- Infrastructure
- Competition

APPENDIX IV: Sampling strategy rationale

Sampling strategy

Background

For sampling the health centers two things are important:

- Do all health centers have an equal chance of being included
- Does the sample strategy correspond with the questions to be answered (and the hypothesis)

Since there are three research questions, finding an appropriate sampling strategy is challenging. For question 1 and 3 the main condition for the strategy is that the country is covered sufficiently and that the sample-size is sufficiently large. With covering the whole country, the chance that local strategies are neglected is minimized. By having a sufficient sample-size the chance of missing strategies is minimized, but more importantly statistical tests can be done to find possible correlations between characteristics and the adoption of innovation.

For question 2 it is important to get some insight in the diffusion process. Ideally, you start at the source of the innovation and study from there in both a contagious way and hierarchical way to where it has gone to. However, since the strategies have to be identified with the same questionnaire, the source is not known beforehand.

What can be expected is that there are more strategies having their origin in Phase-0 areas than in other areas. Both since PBF has been introduced here earliest and because for these trials also NGO's were involved, bringing additional initiatives. Although this will not be the case for all strategies it seems as a useful starting point for the sampling strategy.

About the hierarchy of health centers there is limited knowledge. The Ministry of Health has defined some characteristics which it should meet, both in size (29 staff members) and beds (20 inpatient beds), but there will possibly be some differences between health centers, as catchment population is ranging between 5.000 and 70.000. However, since it is not known whether the catchment population also determines the place in hierarchy, all health centers are assumed to be quite equal to each other (at least for the sampling).

All health centers are supervised by supervisors from the district hospitals. In that way health centers are clustered by their supervising hospital. Probably through this hierarchy the strategies will first spread within the cluster and later spread from cluster to cluster, then most likely in a contagious way. Also for these supervising hospitals there seem to be no formal differences in hierarchy.

Thus, both for health centers as for district hospitals there is assumed that there are no real distinguishing characteristics, except for PBF-phase, on which the sampling should be based. However, health centers are clustered around district hospitals, a fact that could be used for more strategic sampling.

Sample size calculations

Since there is not much known about the results that will be found, calculating the sample size is difficult and will mainly be based on some 'rough' assumptions. For the different indicators it will be tried to score them between 2 and 10 (mostly for the perceived attributes of the innovation). Since the deviation is not yet known, a common formula for estimating the deviation is used: $\sigma^2 = (R/4)^2$, with R being the range. Since scores are more likely to vary between 3 and 9, the range will be 6, leading to $\sigma^2 = 2.25$.

Sample strategy

As stated before, it is important to have the country covered with the sampling, but it is also important to be able to see diffusion patterns (within and between clusters of health centers). Therefore, the district hospitals are first selected and then from each included district hospital half of the health centers is included. For selecting district hospitals there is chosen for the following strategy:

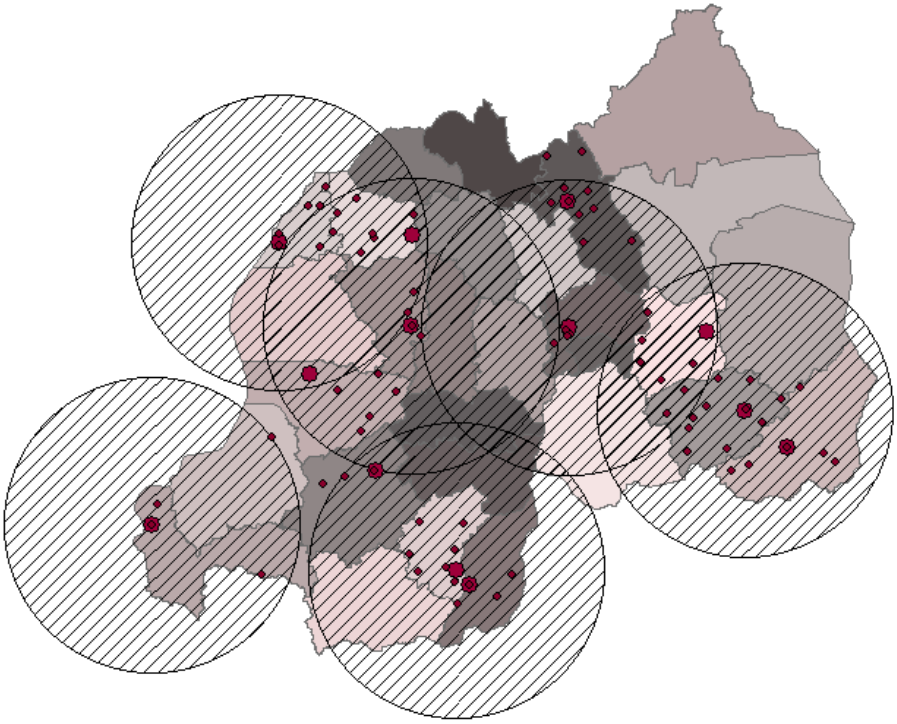
As the strategies are most likely to sprout in the phase-0 areas, randomly ~30% of the district phase-0 district hospitals are selected. Around these phase-0 hospitals a circle is drawn. In these circles there will also by lying other hospitals. From these hospitals randomly one phase-1 and one phase-2 hospital are selected. In this way, within a limited distance, three hospitals are included through which a possible diffusion pattern can be analyzed.

Some hospitals are far away from phase-0 hospitals and thus will never be included in those circles. For that reason, also from the phase-I hospitals that are too far away from phase-0 hospitals, 30 % is (randomly) included and also here circles are drawn to include phase-2 hospitals.

From these included district hospitals, half of the health centers are randomly included (thus 30% of hospitals & 50 % of health centers → ~ 15% of all health centers included). In this way, the health centers as shown in Figure 1 are selected.

The mean distance between to district hospitals is calculated to be 15 km. This makes sense, since in that case, a hospital is (on average) never further away than a 2 hour walk. Then, when a phase-0 hospital is selected, the close surrounding hospitals are often also phase-0 hospitals. Thus a radius of only 15 km would not be wise. Then, when extending the radius to 30 km, the chance increases to have also phase I or phase II included, but with some trials it turned out that in many cases not both were included. Therefore, an extra 15 kilometers was added to the radius, becoming 45 km. Using this gives the results of Figure 1. Most areas of the country are covered, with some exceptions (however, the chance that these would be included was equal). There can also be seen that there is some overlap between the circles. This is unpreventable with this circle-size. However, by choosing the center-points randomly, the increased chance for the hospitals in the overlapping areas is also (quite) random.

Distance between hospitals can with this in mind also be expressed as units, or classes. Class 1 are the hospitals within a radius of 20 km. Class 2 are the hospitals with a radius between 20 and 35 km. Class 3 is between 35 and 45 km. In this way the influence of distance between hospitals can be taken into account.



APPENDIX V: Theoretical Framework

Theoretical Framework

To frame the proposed research in international research, a theoretical framework through which the problem is regarded is proposed. There is the framework as described by Rogers, 1995, which deals with the diffusion of innovations (Rogers, 1995a). Innovation is defined by Rogers et al., p.12 as: "*being a practice that is perceived as new by the unit of adoption"* (Rogers, 1995a). Innovations as were mentioned in the problem description thus seem to fit this definition. Advantage of the framework of diffusion of technology is that it applicable in many disciplines. Also, it is a very pragmatic method and can relatively easy be generalized. Furthermore, the framework is relatively old, resulting in a clear research methodology (Rogers, 1995c).

The diffusion framework finds its roots in sociology (Greenhalgh, Robert, Macfarlane, Bate, & Kyriakidou, 2004), and thus the applicability to the health care sector should be regarded critically and possibly be changed in some ways for guaranteeing an appropriate use.

Variables influencing diffusion

There are four main areas on which diffusion depends. First are there the innovation characteristics itself. Second are the characteristics of the innovators. Third is the environmental context. Last are the communication channels through which the innovation spreads.

An innovation encloses five attributes which contribute to the success of the diffusion of the innovation, being the perceived relative advantage, the compatibility, the complexity, the trialability and the observability of the innovation (Rogers, 1995a). Further characteristics that are mentioned are whether the innovation has public or private consequences, and how the benefits relate to the costs (Wejnert, 2002).

For the success of the diffusion, not only the characteristics of the innovation itself play a role, but also characteristics of innovators play a large role. The innovators can be regarded on different levels (Anderson2004), and simultaneously, the characteristics that influence the diffusion differ. The levels of analysis are individual, work group level and organizational level. Examples of characteristics are personality, motivation, team structure, leadership style, organizational strategy and organizational culture Anderson2004).

Regarding the environmental context (Wejnert, 2002) identifies four main areas which are related with the diffusion. Geographical settings of the innovator play a role, like the applicability of the innovation in the present situation. And also geographical proximity, as will be discussed later, influences the diffusion process. Also there is the societal culture, with belief system, traditionalism and cultural homogeneity included. Then there are political conditions and lastly the global uniformity.

With communication channels is meant how the message comes from one to another. This can be one-sided channels, like mass-media, or two-way channels like personal contact. Roughly, for getting knowledge of an innovation, mass-media has an important role, but for adoption, personal contact is much more important. Therefore networks of people have an important role in diffusion research. For the case of Rwanda, these elements are thought to be very influential, as with the decentralization as it is organized, there is fast communication from bottom to top and from top to bottom, influencing diffusion.

Diffusion in time

When looking to diffusion in time, two approaches can be used. The diffusion process can be approached on an individual level. When adopting, five, often overlapping stages are identified, being knowledge, persuasion, decision, implementation and confirmation (Rogers, 1995d). When looking more on group level, different groups of adoption can be identified, being the innovators, early adopters, early majority, late majority and laggards.

For each of the different stages in the adoption process, different characteristics have a role in the outcome of the phase. For the knowledge phase receiver variables and social system variables are important. In the persuasion phase, the characteristics of the innovations have an important role. For the communication and confirmation the communication channels play a role.

How the different adoption groups adopt the innovation is nicely represented in the left side of Figure 2, where the characteristic S-curve is seen. First a small group of innovators adopt, after which the early adopters follow. The early adopters are often opinion leaders, inspiring other people to adopt as well. As a result the diffusion increases in steepness (in time) with the early and late majority and slows down when spreading among the laggards. Although many characteristics of the different groups have been described, boundaries between groups are somewhat arbitrary. As stated before, direct communication is important for the decision of adoption. Therefore, although someone is to adopt very early, he can be the last in his network to adopt.

Diffusion in space

Because it is expected that the PBF system is not yet well adapted to regional differences, spatial differences are expected. For that reason, a more central place is given to the spatial process of the diffusion. Although diffusion research has its roots in anthropological research, many other research traditions adopted the use of diffusions of innovations framework, but all with their own interpretation on innovations and methods to study the units of analysis (Rogers, 1995b). Although separate traditions, historically there has been much interaction between all disciplines, strengthening the research methodologies.

One of the major research traditions in diffusion of innovation is that of geography. The roots of social geography in general lie in the fact that social groups are not evenly distributed over space. People move, but they do not move equally in all directions. There can be barriers, like a forest to come from point A to B, while from point A to C there are roads. Also there can be hierarchical influences, people rather move to settlements than to small villages. From this framework, also the spread of innovations was regarded in the diffusion research by geographers. Therefore, in the study of diffusion of innovation from a geographical point of view, the role of spatial distance in diffusion is the main subject (Clark, 1984).

When applying spatial methods on the diffusion, it is necessary to know more about spatial data. Spatial data is data that also consists of a spatial component, placing the data in the two dimensions of space. This introduces spatial dependence; attributes are likely to be similar in nearby location. That is the reason that other methods have to be used to study spatial data (Moore & Carpenter, 1999). Studying these spatially-related objects can be done in two ways. It can be used to describe the locational characteristics, requiring exploratory analytical techniques, or to analyze spatial relationships, requiring explanatory analytical techniques.

For spatial diffusion, there are generally two regularities for diffusion. First, there is a contagious effect. In this, the diffusion depends on distance between the origin, the closest are usually affected first (AIDS-article), and can be regarded like a spreading oil stain. Second, there is a hierarchical effect. This can be best understood when speaking of cities. Phenomena often diffuse first among the large cities and from these large cities spread to medium cities, and then to the smaller towns, as is shown in Figure 1. In practice, often a combination of these types of diffusion is seen.

One of the founders of the research to the spatial diffusion processes is T. Hägerstrand (Clark, 1984). He tried to identify regularities in both space and time for the diffusion process by creating a model to describe diffusion (Hägerstrand, 1953). In this model, two major assumptions were made about the spread of innovation. First is that information is spread only by telling at pair wise meetings of persons, and that when told, the innovation is immediately adopted. Second is that the geographical distance influences the probability of being paired with a carrier of information in a negative way (and to be estimated empirically) (Shannon, Bashsur, & Metzner, 1971). In this way both contagion and hierarchy are included. Contagion is integrated because the distance plays a role in the probability of meeting. For the hierarchy, this is integrated since in larger cities there live more people, which increases the chance of meeting one in a large city. In further development of this model, instead of geographical distance, also other (physical or psychological) components could play a role to determine spatial distance.

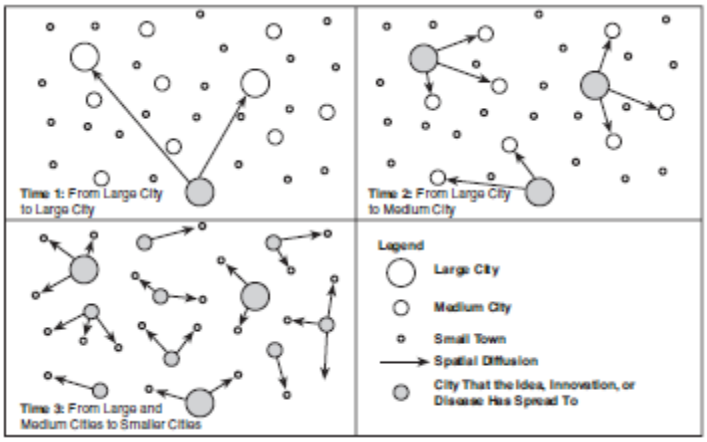


Figure 1: Typical sequence of hierarchical distribution. Adopted from Kuby2004

Presented in space diffusion does depend on certain variables, but often the process is like in Figure 2 (right side). This is typically a mixed hierarchical diffusion (Moore & Carpenter, 1999). At the start there are some innovators and early adopters on various places. Then, the early and late majority are mainly formed from contagious diffusion of the innovation and the laggards are the remaining gaps. For the case of Rwanda, it could be well possible that it is slightly different because of the decentralized approach innovations find their spread to central in a faster manner.

An example to illustrate this process is perhaps the PBF policy, even though it is slightly different from normal diffusion because it is government-driven. It was first implemented in some remote areas, far from the center, thus being the innovators (Butare and Cyangugu). Then, there was an initiative in the center (Kigali), being the early adopter. After that is quickly spread over the rest of the country, with phase I areas as the early majority and phase II areas as the late majority. Within

each district, probably a quite similar pattern can be seen, when looking on when they were introduced with it.

Linking temporal and spatial diffusion

Obviously, temporal and spatial diffusion are linked to each other. The diffusion presented in time, is the same as the diffusion presented in space, only the presentation differs. To study both temporal and spatial aspects of epidemiology GIS has been used (Moore & Carpenter, 1999). GIS means geographic information system and it is "an integrated set of computer hardware and software tools to capture, store, edit, organize, analyze and display spatially-referenced data" (p. 154, Moore& Carpenter, 1999). Where historically GIS was quite difficult to manage, is has increased a lot in user-friendliness. Also, spatio-temporal GIS visualizations and exploratory spatial data analysis has become more accessible with thanks to the development of GIS. Thus, GIS seems the appropriate tool to approach the innovations in a temporal-spatial way.

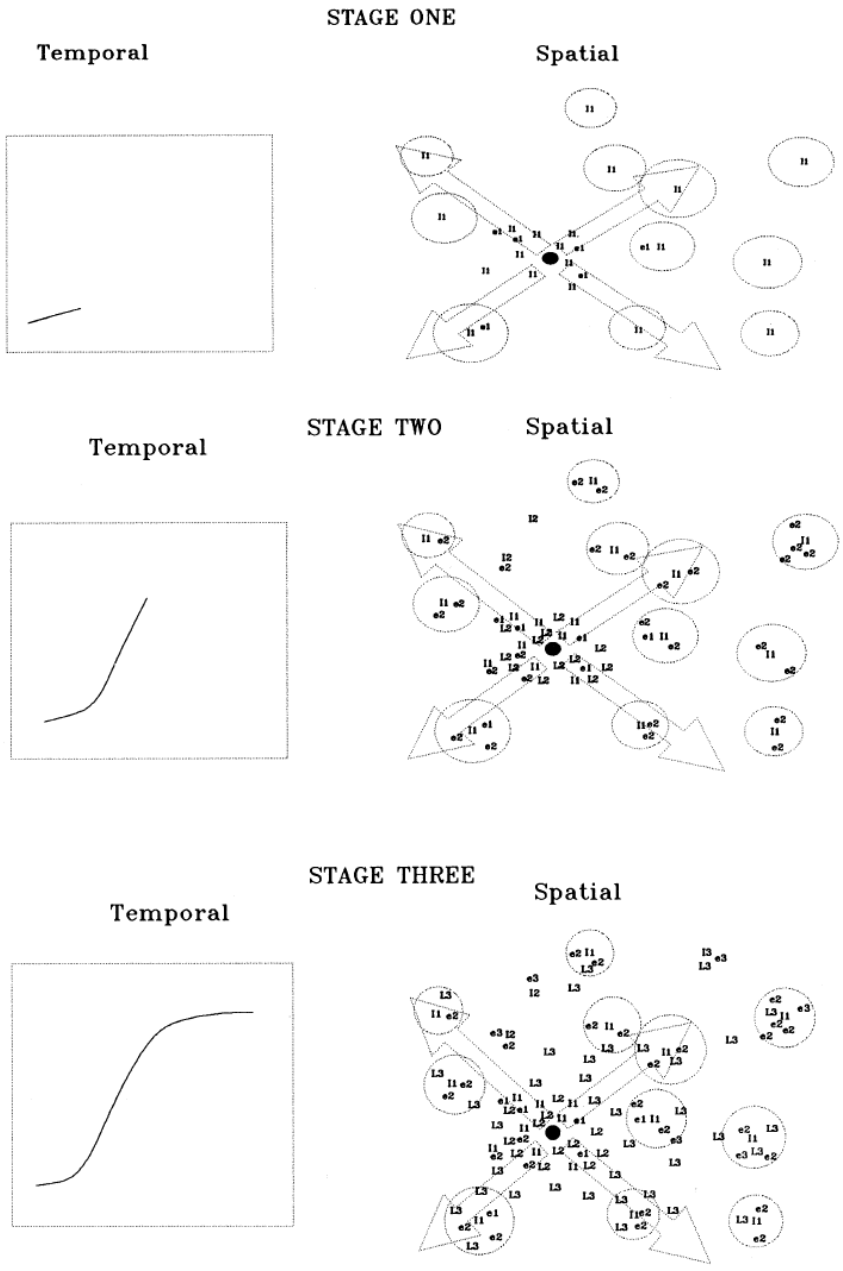
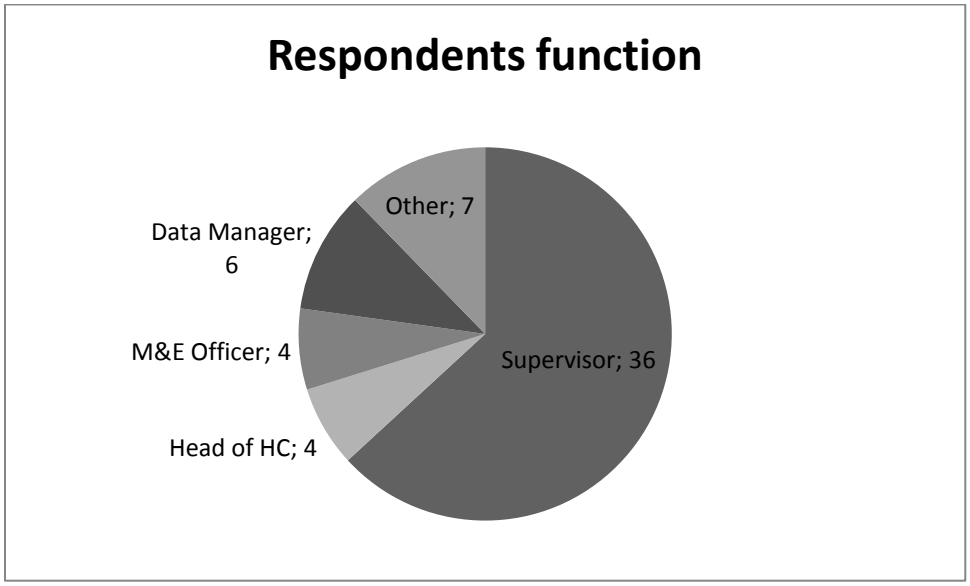


Figure 2: Representation of temporal and spatial diffusion. Adopted from (Allaway, Black, Richard, & Mason, 1994)

APPENDIX VI: Extensive analysis answers on questionnaires

Function

Most of the questionnaires are answered by supervisors (36). Other than I expected, supervisors are not specifically for one or two health centers, but they all have a different domain in which they supervise (PBF, community health, etc.) This has not been further subdivided, since not all respondents have indicated which domain they were specialized in. Because deliberation was allowed, I think all areas will be covered anyway. Other functions seen are head of health center (4 respondents), data managers, monitoring & evaluation officers and other (mostly being one than more person).



Is this related to the answers on various questions?

Question 1.1 (which services do they offer)

Everybody has answered this question. Curative care, deliveries and vaccinations are delivered in all but one health center. The health center that does not deliver curative care is different from the one that doesn't provide for deliveries and vaccinations (but this last one is very probable to have misunderstood the question, since in later questions, a number of vaccinations is given).

There are 9 health centers not providing natural family planning, while 8 other health centers don't provide modern family planning and STI (strongly correlated). This seems (although not significant) correlated to receiving funding from faith-based organizations. Antenatal care and growth control is offered in almost all health centers.

Concluded can be that the minimum package of activities is adopted broadly by the health centers. With some exceptions it can be said that the health centers all offer the basic package of activities

Curative care	98%
Deliveries	98%
Vaccinations	98%
natural FP	84%
modern FP	86%
antenatal care	93%

growht control	96%
STI	86%

Interesting questions: relation with faith-based.

Question 1.2 (catchment sectors of HC)

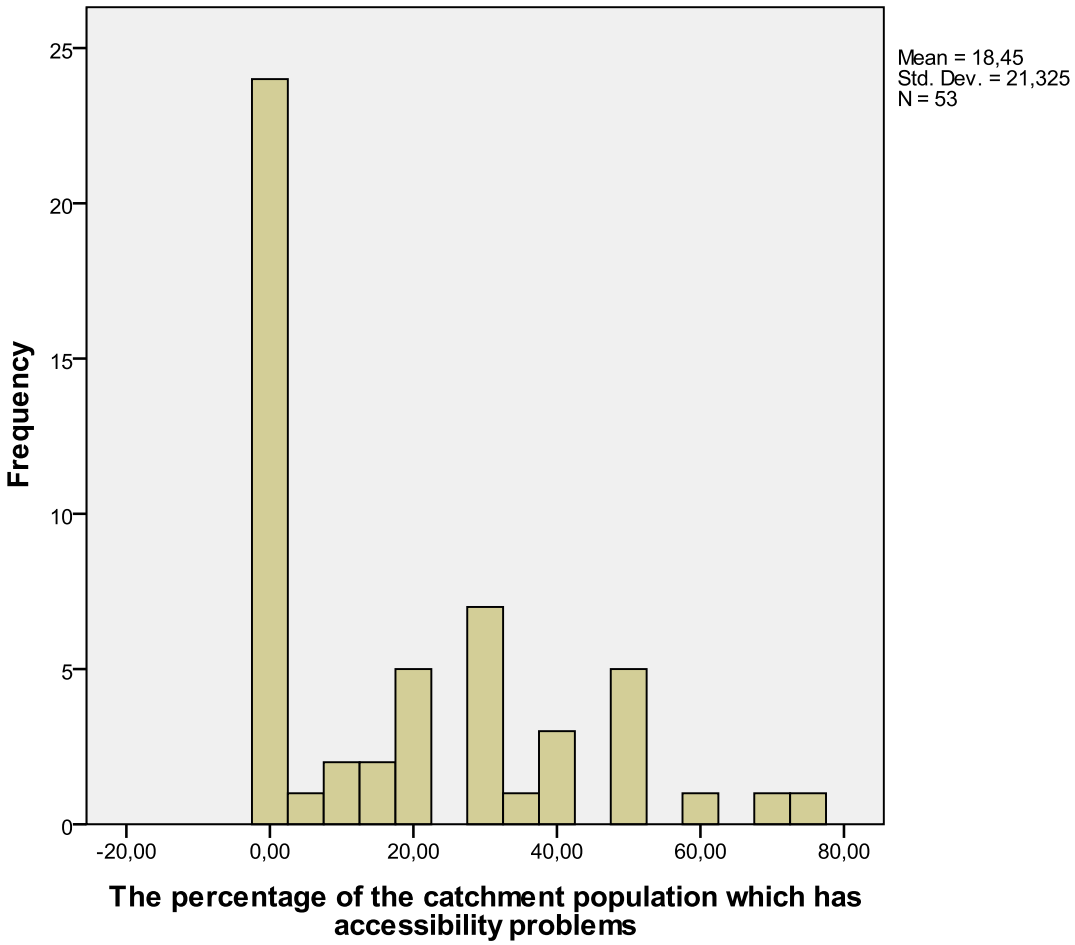
20 of the 57 hospitals serve also people from other sectors. This can be because there is no HC in that sector, or that sector is too large.

What can be concluded is that for that the aim of the MoH to make sure that every sector has one HC to serve them, is not yet the case

It would be interesting to know how this is related with the questions about competition

Question 1.3 (Accessibility problems)

When looking at the histogram, in about half of the cases there are accessibility problems. **Causes are various, further analyze these causes.**

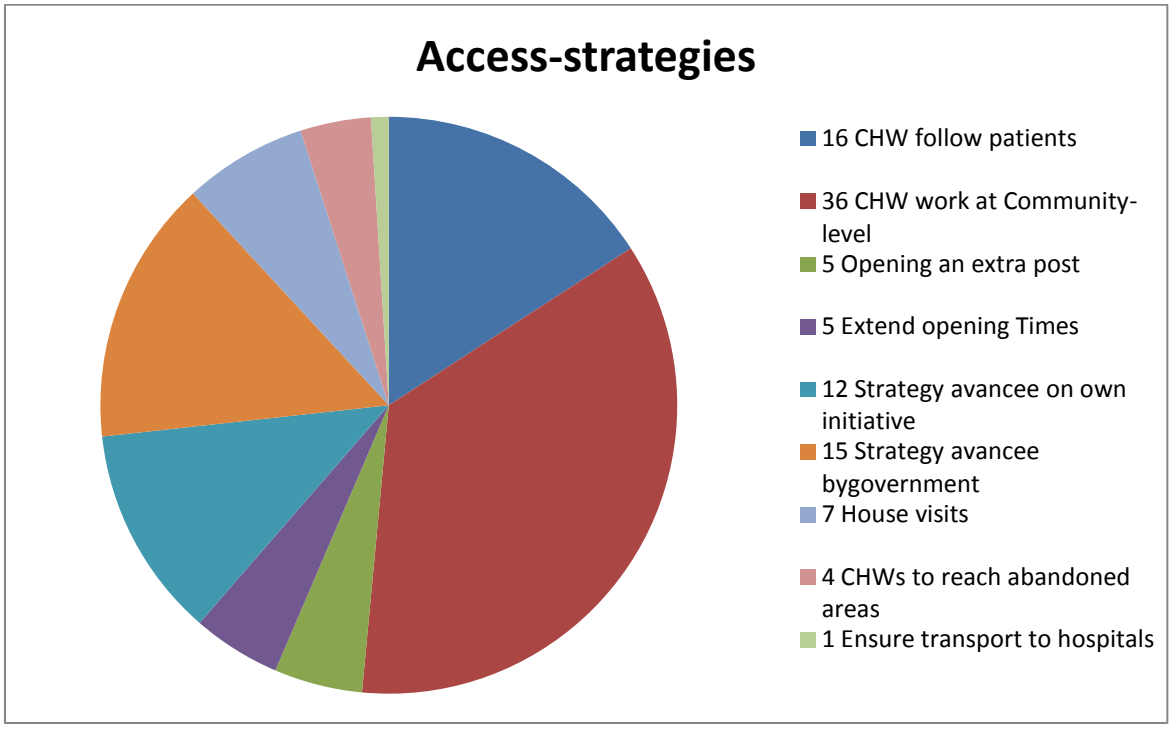


No relation with the district or province the health centers are located in.

Innovations

Access

When studying the mentioned innovations, they can be categorized in different categories and subcategories. Almost all health centers have strategies to improve access of the health center, with 50 health centers mentioning at least one strategy to improve access. In the following Figure the share of different initiatives is shown:



Community Health workers

What can be seen is that Community Health Workers are being most important for improving the access to health centers. Important in the health care system is how people enter the system. In Rwanda, the first entrance is through the community health workers (CHWs). This is by reaching to abandoned areas, follow patients, and do various work at community level. Being so clearly present, this also indicates (correctly) that community health workers are a government strategy, which has quite recently been introduced. However, when looking at the origins of this function, they can be found in PBF (when looking at the interviews).

The system for these CHWs has started on voluntarily basis (already in the nineties), but recently has formally become integrated in the health care system; CHWs are now paid as employees, even with their own specific PBF (Pose,2011). Every community elects at least four CHWs, all with their specific responsibilities.

In the questionnaire, these CHWs are regularly mentioned to play a role in different processes. They are said to improve access, by doing work at community level, provide follow up and retrieve people in abandoned areas. Also, they play a role in involving the community, since they are part of the community and help in the sensitization.

Traditionally there have been some differences, with for example some districts in which they received some monetary award for bringing people in (interview Huye). With the formalization of CHWs these difference have been reduced. In all but 10 health centers, sensitization of CHWs has been mentioned. When keeping in mind that open questions were used, it can be expected, that in all health centers, CHWs are being used for this. Also doing work at community level is shared quite broadly, but there could be some more difference in this, further study to look at this spatially is required.

Changes in health posts

In some places, there has been chosen to open an extra post, or change the opening times of either the health center or specific services the health centers provided. This clearly is meant to improve the access. Probably the diffusion of this is quite limited, but it is interesting to see what characteristics play a role for this decision.

Strategy avancée

Initially, the strategy avancee has been a government initiative to improve the vaccinations of children. On fixed moments health workers move into some places which are far-away from the health center, to make sure they are reached as well. This I've covered under 'government strategy avancee'. However, there are some places where it is no longer only used for vaccinations, but used as a general strategy to improve access. This is caught under 'own strategy avancee'. This really seems a strategy which is interesting to analyze further.

Other

Other strategies mentioned are house visits. For this, it is difficult to estimate whether this is done by CHWs or HC employees and could largely differ between respondents.

Equity

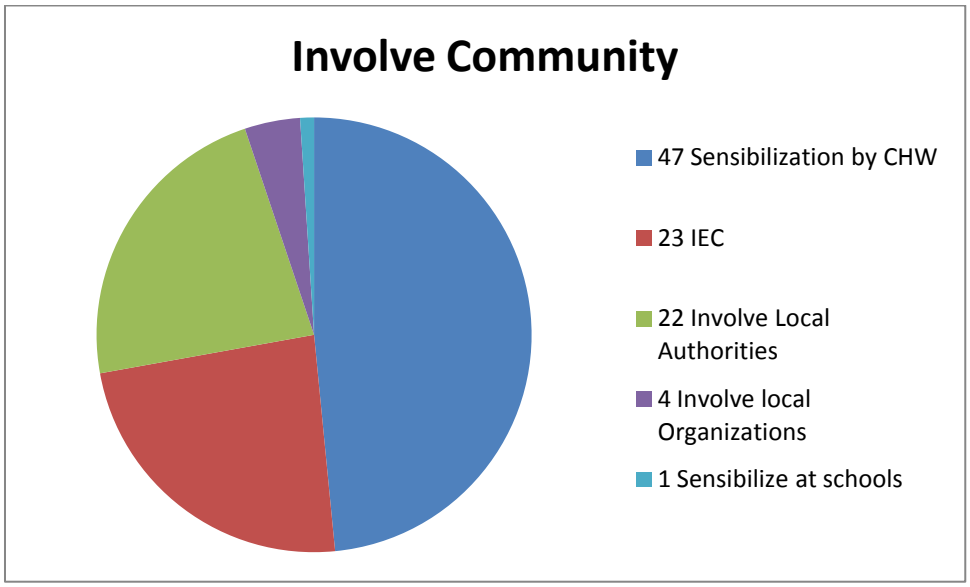
Measures from the category equity are much less mentioned (although access and equity are of course closely related). In 4 cases community projects like a community kitchen garden are mentioned. In 2 cases there is reinforcement of the Mutuelles. Also this community project is only mentioned in Kibilizi, Byumba and Kibuye.

Involving Community

In different ways the community can be involved. It can be tried to reach the population directly. This is done via teaching and IEC-programs(information, education and communication). Also the hierarchy in communities can be used, by involving local organizations or authorities to help in achieving some goals.

It is not clear to what extent there is overlap between teaching, sensitization at schools, IEC and sensitization by CHWs. For that reason they are both considered separately, but also together as education.

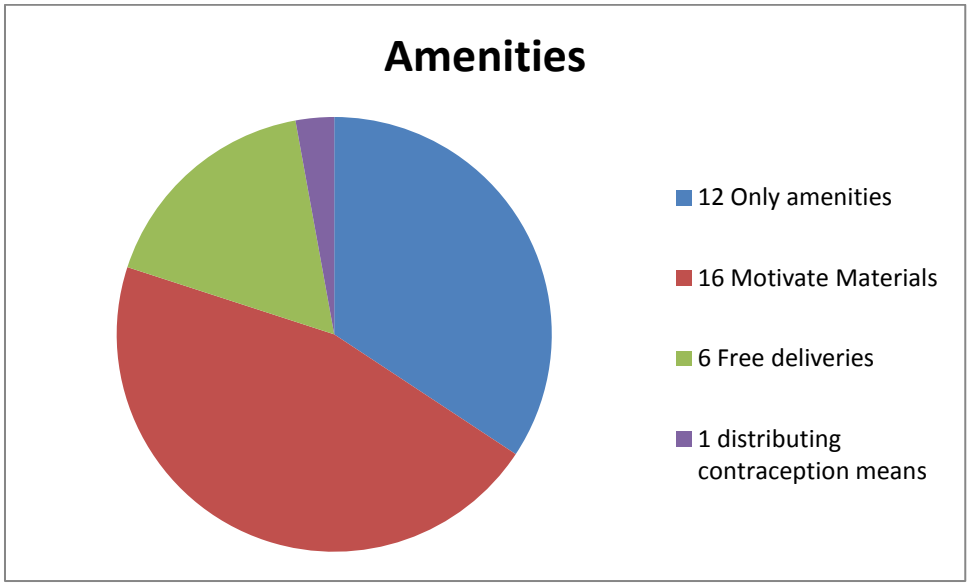
Also here, the Community-health workers have the greatest share. But also involving local authorities and providing IEC (information, education and communication) are important. Both IEC as involving local authorities are close to significant relation with district. Further analysis for these would be interesting.



Amenities for people

There are a few kind of amenities given. There is free care (e.g. deliveries after 4 prenatal visits) and at some places contraception means are freely distributed. But also other materials as clothes, mosquitonets, soap and umbrella's are given. Here it seems that some funding is required (either from government or NGO's), but there are also more creative solutions when budget is low. A lottery is held, in that way costs are lower but there are still some effects.

The use of amenities seems to be limited, it is only mentioned in 13 health centers. Where from some sources I've understood that it is a government program, by others I understand it is not nation-wide. Probably it is only implemented in some districts, since it is depending on the district where it has been implemented. This would be an interesting innovation to look into in more depth



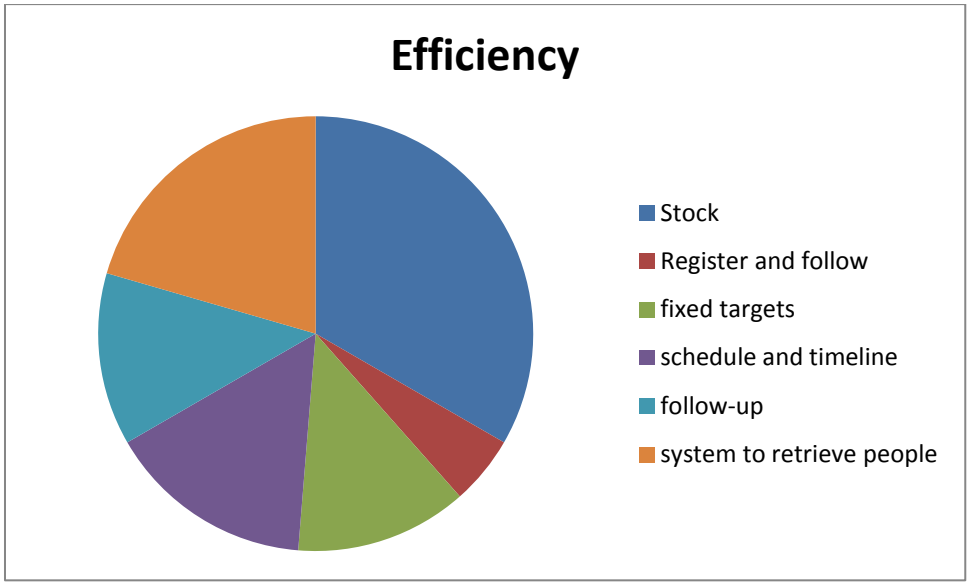
Patient preferences

In different ways the patient preferences are kept in mind. However, because of the open questions it might be possible that not all supervisors have thought of these kind of strategies, even when they are there. E.g. providing clean rooms is quite likely to be in most health centers, even though this is only mentioned in few cases. Other things mentioned are offering family planning methods, support of patients, involving the husband and ensure patients that if needed there will be transport to the hospital. However, all is very limited mentioned, single cases. Therefore they are not analyzed further

Efficiency

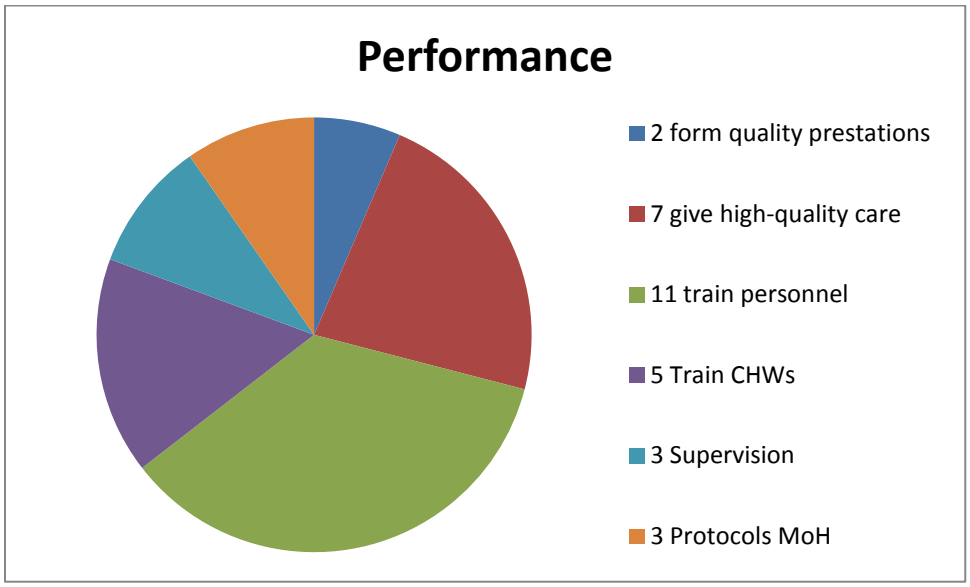
For improving the efficiency there are more cases mentioned. Most mentioned is having the materials on stock. It could be argued whether this is indeed a strategy, but of course it is very important; having the materials on stock is of course necessary for good treatment.

Most interesting regarding the efficiency seems to be the schedule/timeline for the vaccinations. This is mentioned in multiple health centers and seems like an interesting strategy. This is only seen in a few districts, being Byumba, Kaduha, Kibilizi and Kibuye. Also registering and following patients and giving them follow-up contributes to the efficiency of a health center.



Technical performance

Some strategies to improve/ensure the technical performance are listed. The most interesting share of improving the technical performance is the mentioning of training the CHWs or the personnel. On the other hand, it could well be present in many more health centers, only not mentioned. Other is to form certain quality targets, giving high-quality care, supervise and correctly implement the Ministry of Health protocols. None of these strategies are related to districts.



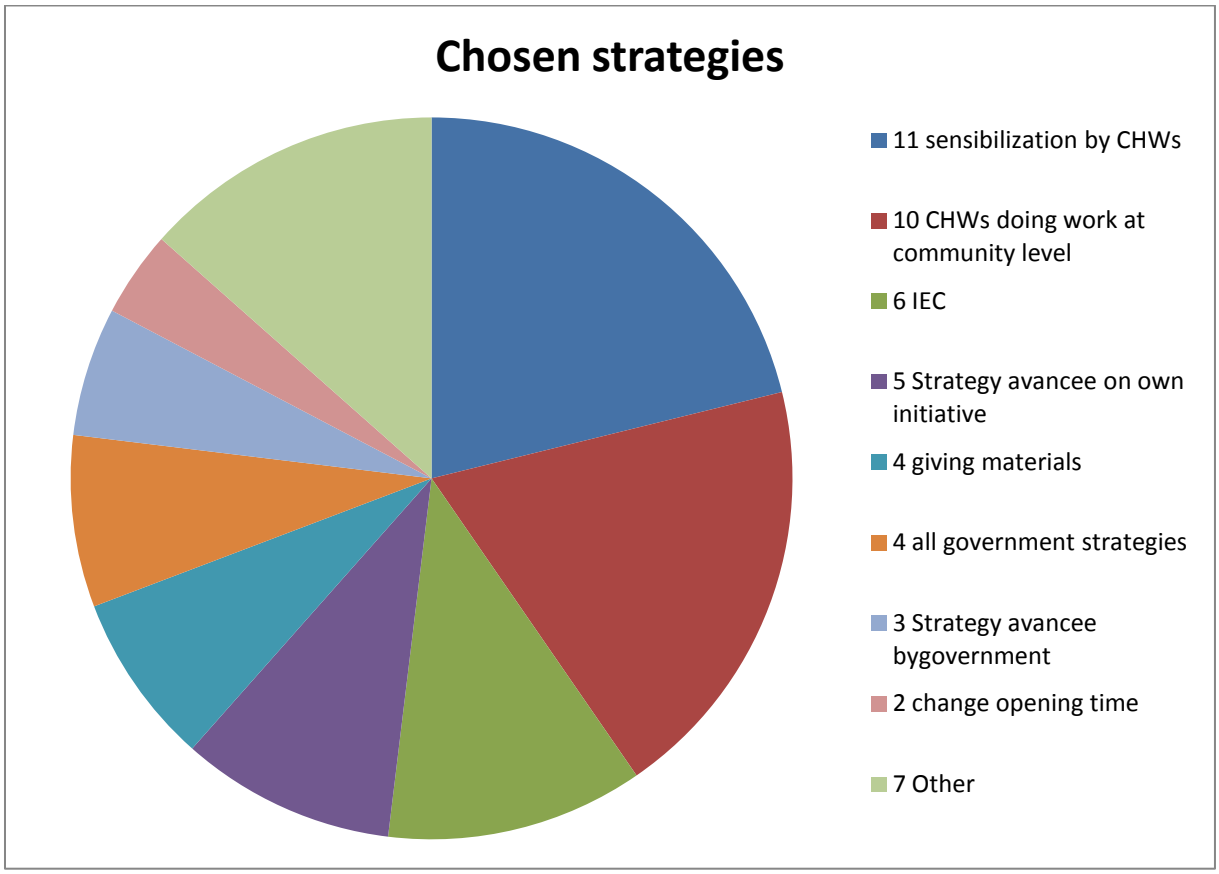
Interpersonal relationship

There is an increasing effort in Rwanda to focus on customer care. Also in health care this becomes more and more important. However, in the results, the importance of this is not yet recognized (or implemented). Other aspects are giving a warm welcome, hiring good personnel and inform them well during the visits.

Working on the interpersonal relationship is mainly done to sensitize patients during visits. Not very important for further analysis.

Chosen strategies for innovation attributes

In question 2.6 in the questionnaire there was asked to choose one strategy to discuss further, mainly on the different attributes of the innovation. Unfortunately, making this an open question has led to some problems. As can be seen in the chosen strategies, others than desired, many government strategies are chosen; in almost half of the cases there is chosen to answer the questions about the CHWs. Also has because of the choosing the N=57 decreased and varies between N=11 and N=1, making good analysis difficult. One item needs further explanation; some people seem to have misunderstood the question and answered section 3 with all government strategies in mind (N=4). Although not what was desired, this gives some unexpected insight in how the government initiatives are perceived.



Strategies for further analysis

From the discussion of all the previous items, clearly some strategies stand out and are interesting for further analysis, both spatially as on influential characteristics, e.g. health center characteristics. In Table X these strategies are listed:

CHWs doing work at community level
Extra post opened
Change opening times of posts
Strategy avancee of government
Strategy avancee on own initiative
House visits
Village projects
Reinforcement of mutuelles
Sensitization by CHWs
IEC (information, education and communication)
Involve local authorities
Sensitization of communities
Giving materials
Schedule/timeline
Train personnel
Train CHWs

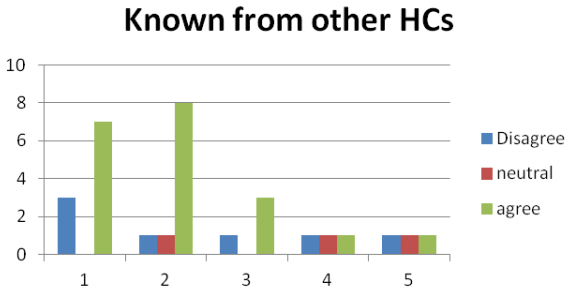
Question 3.1 (innovation attributes, why introduced)

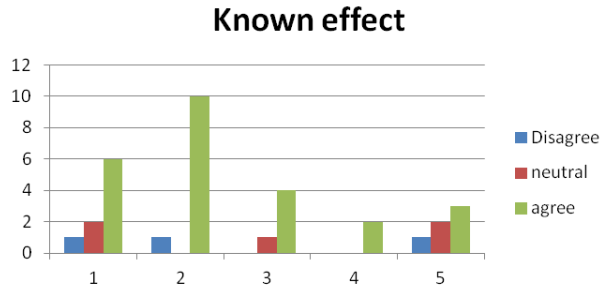
About 50 HCs have answered this question. In 67 % it was already known from other health centers, but in 25% it was not known. When looking at the answer for different strategies, then mainly the use of CHWs is known from other places, but also IEC is known from others at most health centers. Giving materials is less clear.

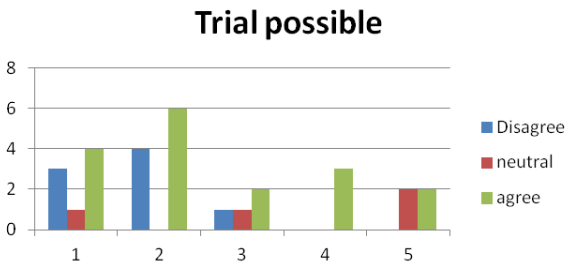
The effect on the demand of care was in 84% known, and in 14% neutral. Therefore, it could be said that this question does not have to be used in further analysis. Also when splitting it to the different strategies, in most cases there is agreed.

About the possibility to abort the strategy later there are some different answers. Clearly some disagree about the possibility to stop with CHWs. Probably they experience it like this because it is initiated from the government.

When differentiated to the different strategies, clearly the health centers don't see all a chance of trial for the CHWs, probably because it has been a government decision.



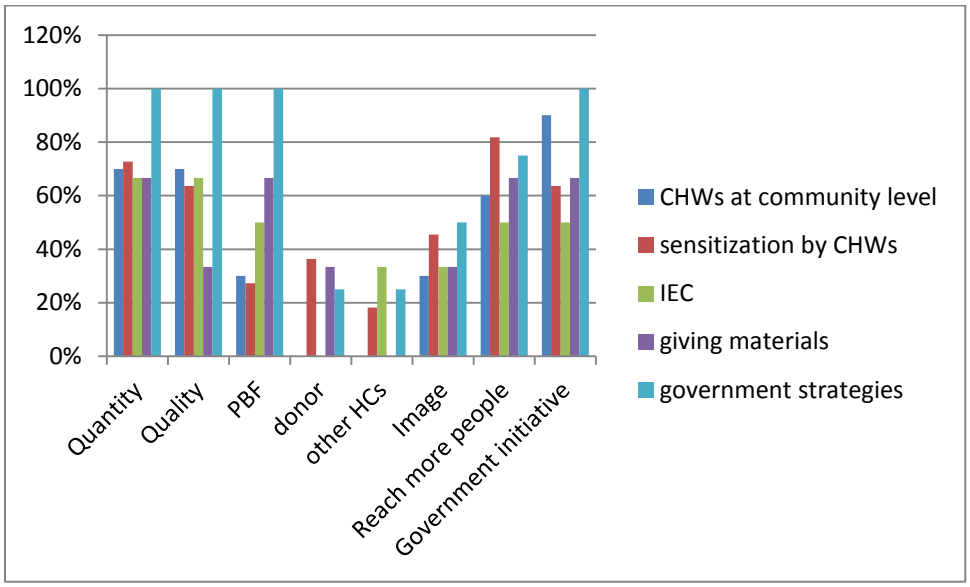




1	**CHWs at community level**
2	**sensitization by CHWs**
3	**IEC**
4	**giving materials**
5	**government strategies**

Question 3.2 (reasons to introduce)

Only of 1 HC this question is not answered. In respectively 75 and 70 % of the cases a reason for introduction is to increase the number of patients treated or to improve the quality of care. The PBF is only in 38% given as a reason. Pressure from donors, or because other health centers have introduced it is low with 14 and 12 % . In 44% of the cases it will improve the image of the health center and in 60% of the cases it is to better reach people, or because it is driven by government.

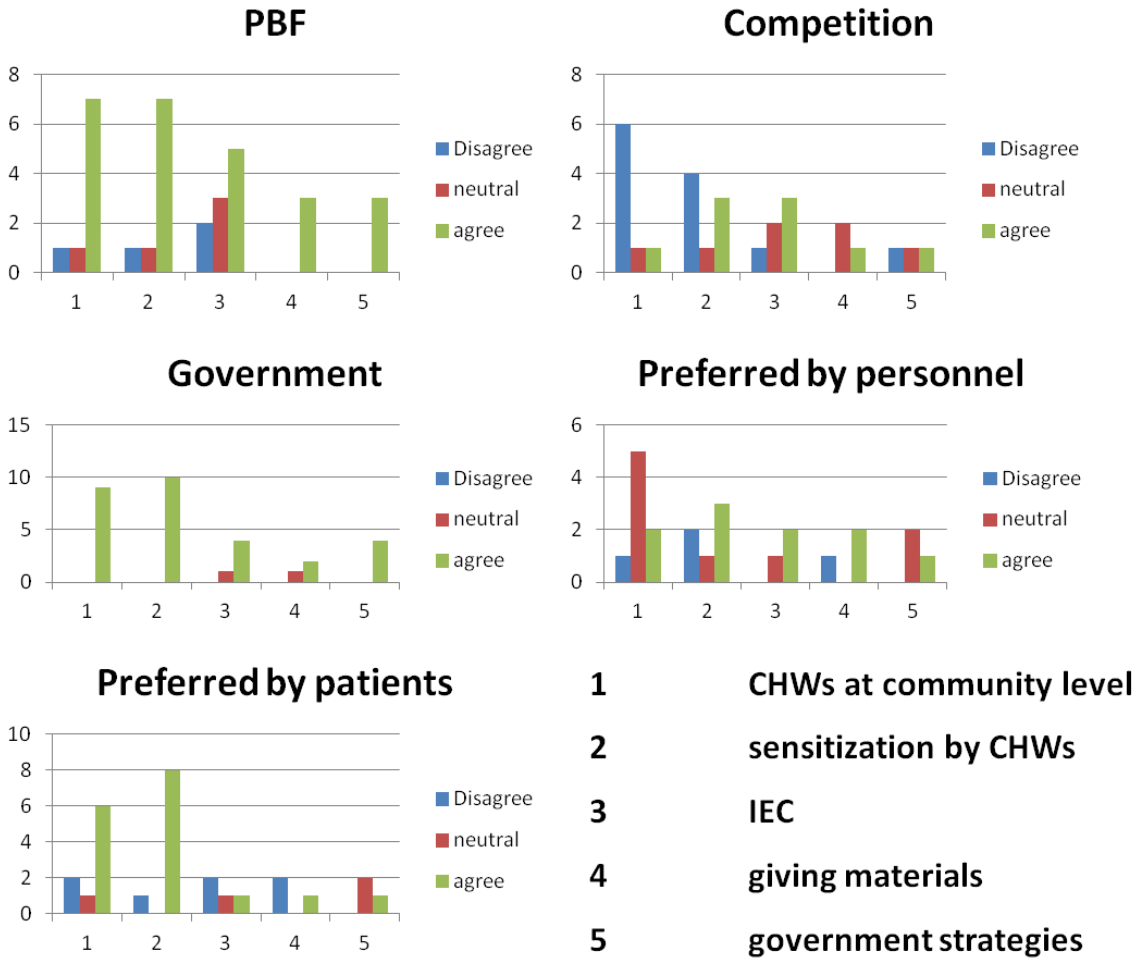


What is remarkable in general is that there are many reasons for introducing strategies. In most cases multiple reasons are given. But in most cases it is tried to increase quantity and quality of care and is coming as government initiative. For the CHWs working at community level, most important is that it is a government initiative, but also increasing the quality and quantity of care and reaching more people are important. PBF and image of HC play a small role, donors and other HCs have no influence on it. Using the CHWs for sensitization however does have some influence. Most important reason is to reach more people, but it is also used to improve the image of the health center. IEC (information, education and communication) is driven by various factors, no single reason stands out. Compared to the other initiatives, IEC seems less perceived as a government initiative. Giving the materials seems clearly driven by PBF, resulting in more care. How it increases the quality of care could be questioned; perhaps that the 'presents' contribute to the care (like mosquito nets).

Question 3.3 (how have factors influenced choice)

Around 50 persons have answered this question. Of them, 75 % considers PBF as an important factor for introducing the strategy and even 88% indicates the policy of the government as an important reason.

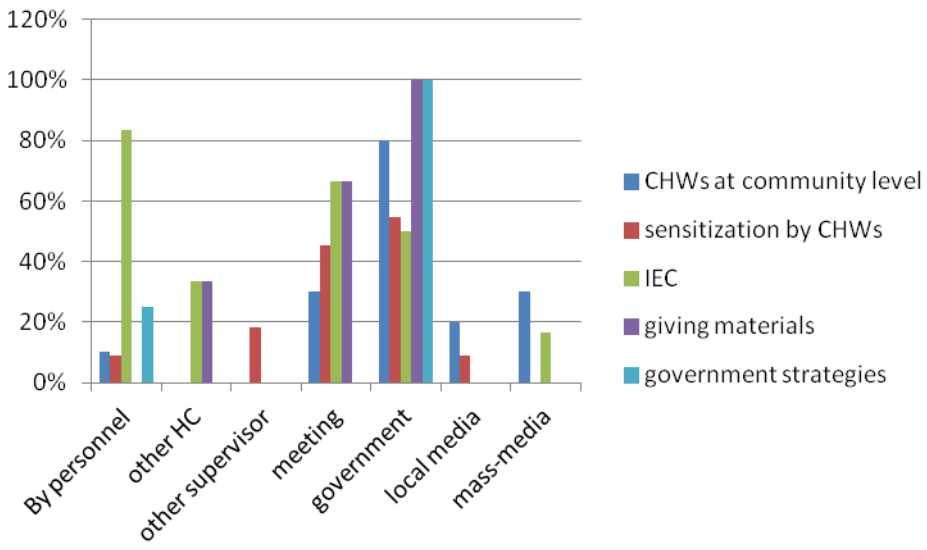
About the competition, it is evenly spread over the three options. 60% indicates that it is favored by patients, 50% that it is favored by personnel.



It can be seen that most strategies (all but IEC) are expected to have a positive effect for PBF. However, most important is the role of the government. The involvement of CHWs is preferred by personnel and patients, but also here PBF and government play a large role. Only for IEC competition had some influence on the decision. Other than expected is that the amenities for patients, the preference of the patient has not influenced the decision very much. Perhaps the materials given are not that much in the patients' interest as that they contribute to their health? Overall, the personnel has at least some role in the implementation of certain strategies, possibly indicating that even though government initiatives, local adaptations to make it suitable in the health center can be made.

Question 3.5 (how heard of the strategy)

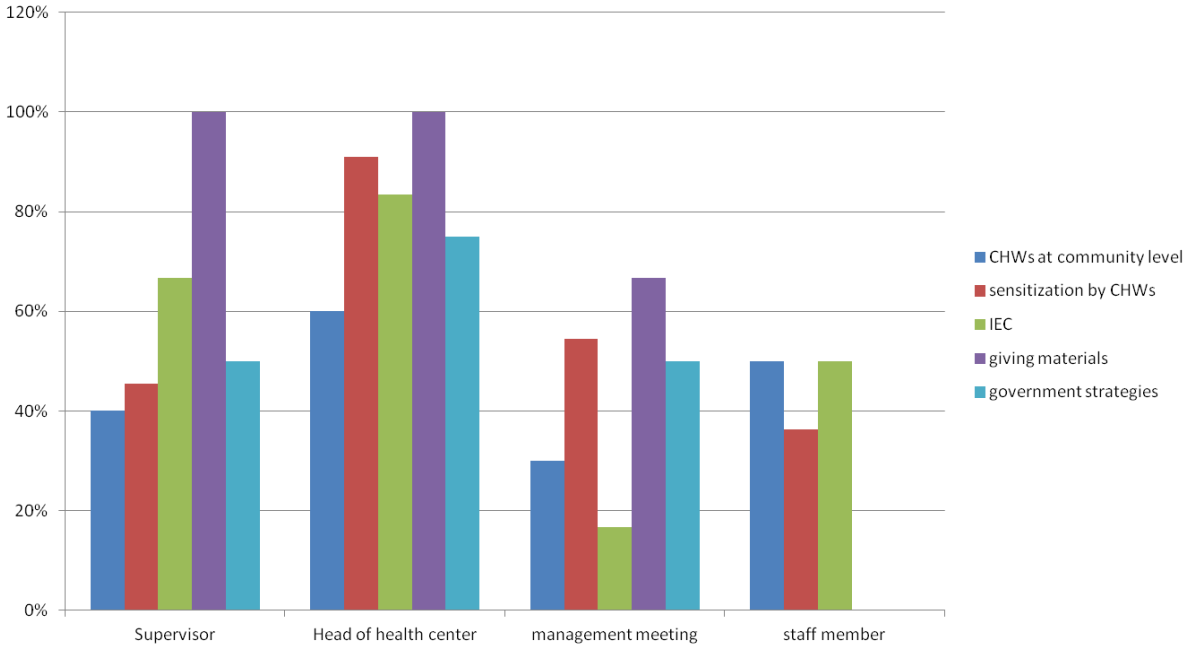
Only 1 has not answered this question. Only about 10% indicates that they learned it from this health center, another health center, a supervisor or media. About 40% has heard of it through a meeting and 60% through the government



What can be seen in the Figure above is that in the spreading of IEC, the personnel has had a large influence. For the other strategies, meetings and government are most important. Unfortunately it is not described how they've heard it through the government, but probably this has been via government memo's or perhaps information meetings. For IEC and giving materials there are other health centers playing a role. **For this, some additional attention to spatial analysis should be paid.**

Question 3.6 (How implemented)

In 70% of the cases, among others, the head of the HC was responsible for the implementation. The supervisor or the management-meeting was involved in the implementation in 40% of the cases. Other personnel members were only involved in 27% of the cases.



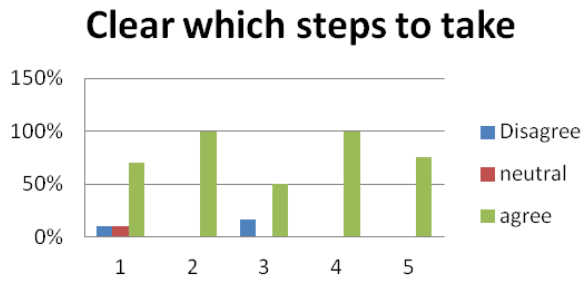
With the CHWs most implementation is done from the health center level (head and staff). Also for IEC the health center is important, but the supervisor also has a large influence. Only for giving materials there is clearly a collaboration between the supervisor and the head of the health center.

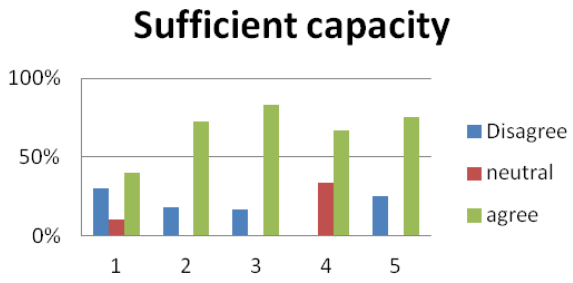
The management meetings seem merely to have a role of approval, but not really involved in really implementing (since it is only mentioned in some cases).

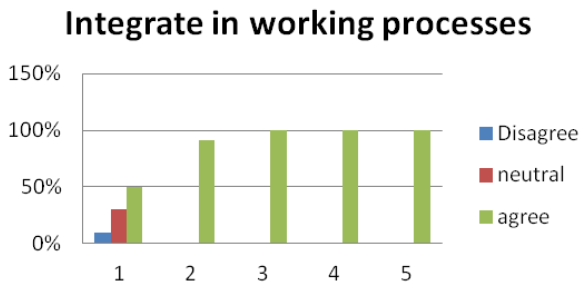
Question 3.7 (Innovation attributes, how implemented)

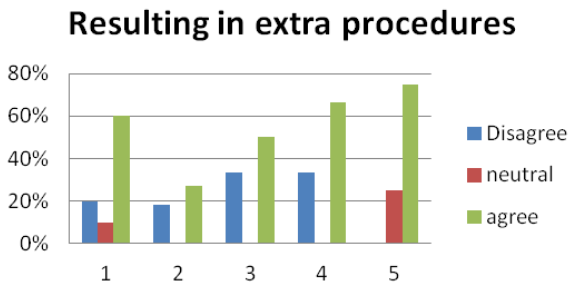
Question has been answered by 52 respondents. 90% states it was clear how to introduce this strategy. 25% states it has not the capacity to meet the patient demand. Integration in working methods was in 87% of the cases possible. However, 60% does state that is has resulted in extra work for the personnel. Only 44% considers the implementation to have been easy. It has affected the PBF revenues according to 78% of the people.

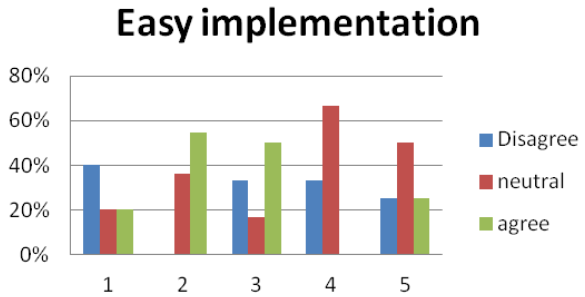
Also when the data has been split for the several strategies, it is clearly known which steps to take. For the CHWs working at community level there have been some capacity problems, possibly for coordination or not sufficient CHWs. This also has been most difficult to integrate in the working process. The IEC also had some problems with implementation, probably because it resulted in extra procedures, just as is the case with giving extra materials.

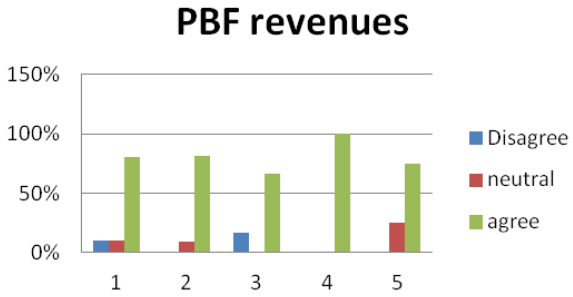












Are the 75% and 78% here about PBF the same respondents? Good check for reliability of the answers.

Question 3.9 (recommend strategy?)

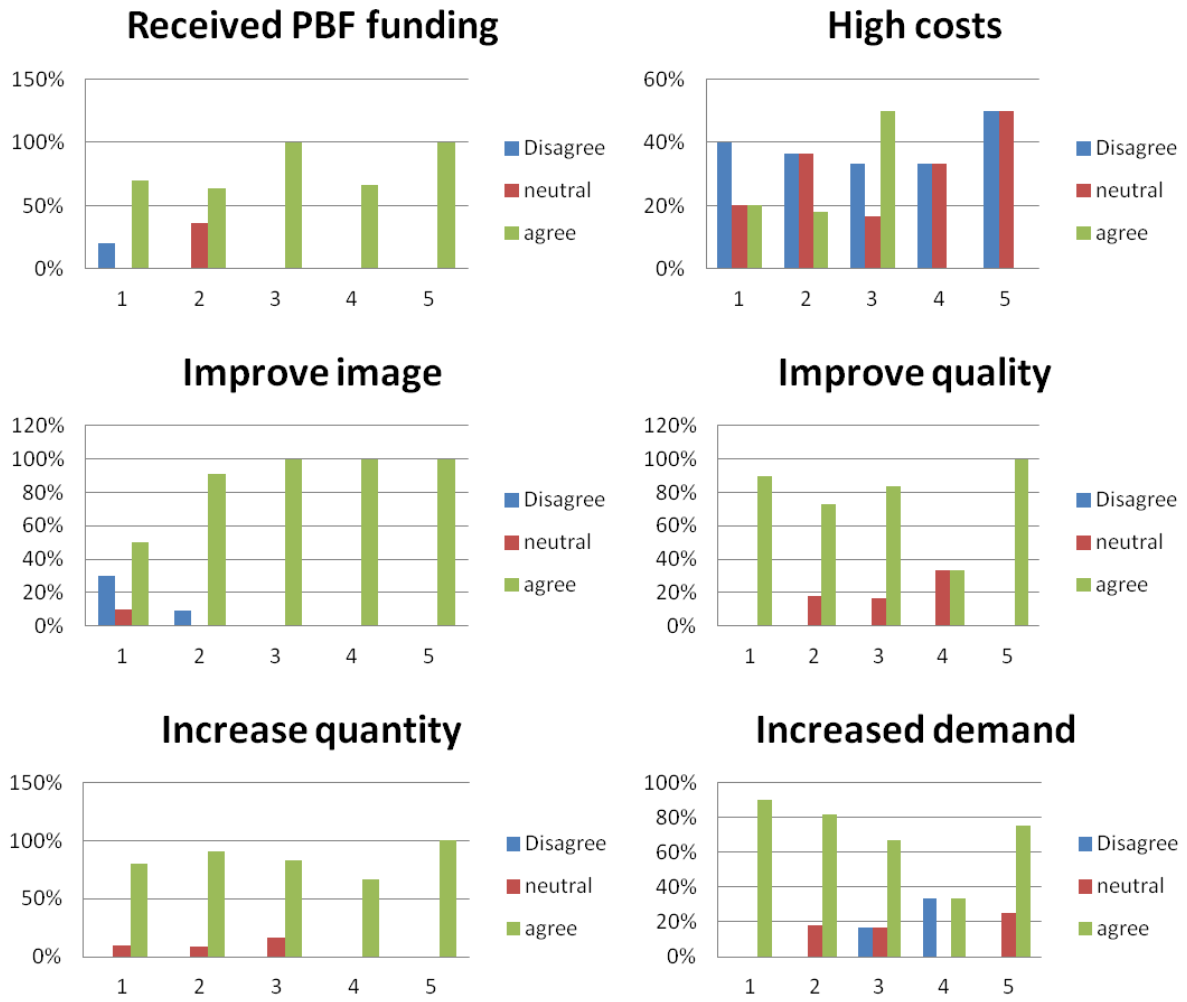
In almost all cases they would recommend it to other HCs (in 2 cases not, in 2 cases maybe). Not very interesting for further analysis, only the ones with not or maybe could be interesting.

Question 3.10

In 14 HCs it has been an example for other HCs. **Interesting to map.**

Question 3.11 (innovation attributes, results of strategy)

Answered in about 50 questionnaires. In 80 % of the cases they indicate that thanks to the strategy more PBF money is received. Half of them indicates that costs were not high, 25% says they were high (indicating that they really read the question). 85% confirms that the image of the HC has improved with the strategy; the quality has increased and also the number of patients treated has increased. In 75% of the cases it leads to more patients coming. **These high scores will probably result in a low dispersion between different strategies, making it less interesting. However, maybe a few strategies come out that are different from the others.**



Only for the questions about high costs, improvement of image and the increased demand there is some difference between the answers. The CHWs seem to result in some extra costs, just as IEC. Probably, the HCs have to take care of these costs themselves, while amenities are sponsored (where high costs would be expected). Work of CHWs does not necessarily result in a better image of the HC (as patients don't come there), but all the other strategies do. Only for amenities for people, demand is not increasing. This seems to indicate that for the patients amenities seem not to be very important.

What is suitable for end-report?

Limited unknown effects; indicating not much own initiatives.

Most strategies are mainly driven by government, but adaptation by personnel seems possible; personnel seem able to make adaptations needed to fit in. Focus is on increasing the quantity and quality of care

Most used communication channels are just government or meetings. Only for IEC the personnel has an important role.

Introduction mostly done by heads of HC and by supervisors.

Innovation's attribute	Questions
Uncertainty	3.1.1, 3.1.2
Trialability	3.1.3
Relative advantage	3.2, 3.3.1, 3.3.2, 3.11.1 – 3.11.5
Observability	3.2, 3.7.6
Compatibility	3.3.4, 3.3.5, 3.7.2, 3.7.3
Complexity	3.7.1, 3.7.4, 3.7.5

Uncertainty

Of most strategies there is low uncertainty, effects seem to be known. Only for amenities and the CHWs doing community work, the effects were not known by all health centers. This could indicate that these health centers were first, or that it was introduced in their surroundings at the same moment.

Trialability

Trialability was for the CHWs not always possible, probably since the health centers perceived to have no choice since the government enforced for this. For amenities and IEC, more easily some testing was possible.

Relative advantage

Driving forces behind the innovations are either government, increase quality and quantity of care and PBF. This indicates that the interests of government and health centers have come closer together because of PBF. Although the government comes with strategies, even then there is an advantage for the health centers, lowering the threshold to adopt. Only IEC seems to have a small relative advantage, but is mainly driven by competition between health centers and government.

Observability

The influence of observability is not very clear, but since every quarter a new PBF calculation is made, in this way it is expected to be high. However, as was indicated in interviews, because PBF payments are often delayed, the link with measures and revenues is not always clear.

Compatibility

The involvement of CHWs is mainly very compatible for the patients. However, for the health centers there are some more challenges. Personnel are not univocally positive and also there are capacity problems. For IEC and amenities for patients, these are not a problem, they seem to be very compatible.

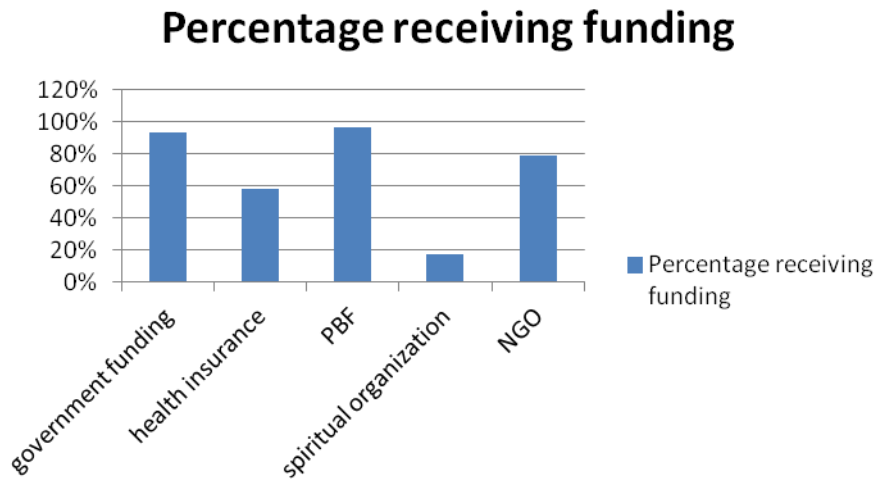
Complexity

Regarding the complexity there are clearly some more problems. Although it is clear what has to be done, it is not always easy to implement. Also, all strategies seem to result in some cases in extra procedures. That even in that case they are introduced, indicates that complexity is not that much of a problem for the health centers.

More important is that there is not too much uncertainty and there are some clear advantages.

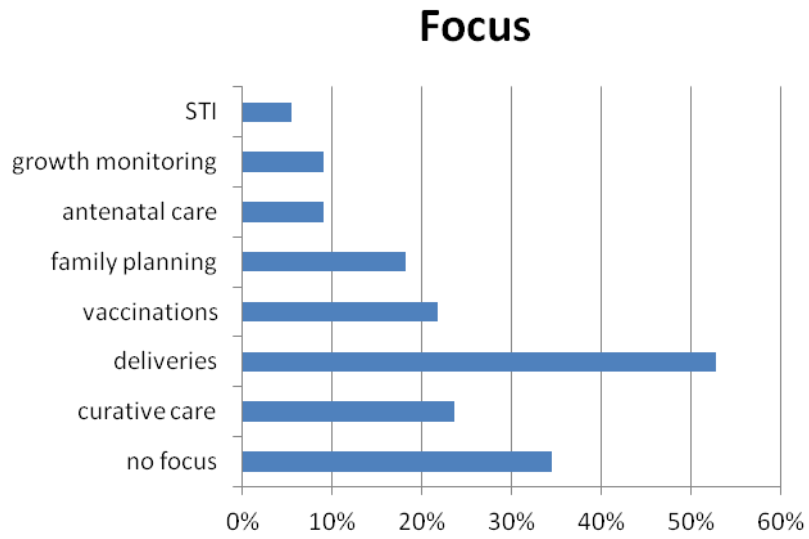
Question 4.1 (types of funding)

Almost all indicate to receive government funding. Half of the HCs indicates to receive insurance funding. Almost all receive PBF funding. Only 10 receive money from a faith-based organization, but 45 receive money from an NGO. From the interviews, it is indicated that there are two kind of NGO – groups, and that all health centers receive funding from either one of them, either an NGO combination or the global fund. For further analysis, best receiving money from health insurance or a faith-based organization could be used.



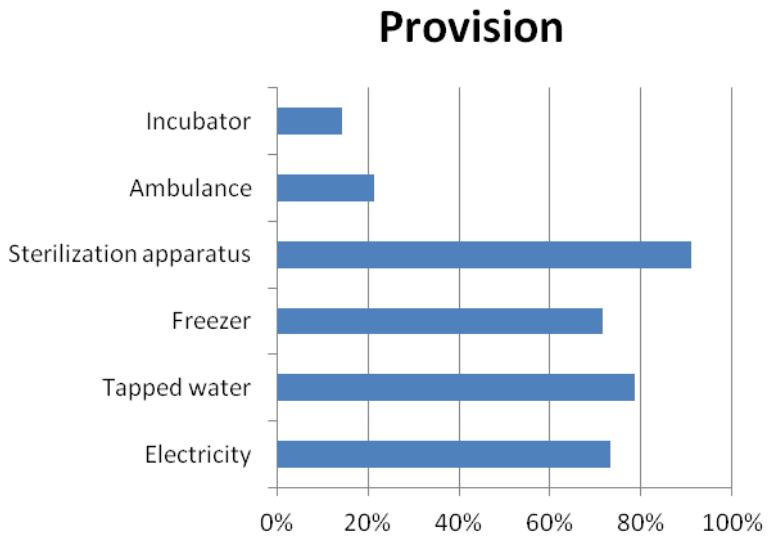
Question 4.2 (focus on service)

This question has been answered by all but 2 respondents. 19 HC indicate to have no specific focus. 29 show a focus on delivery service, and between 10-13 on curative care, immunization and family planning. On antenatal care, growth monitoring and STI not much focus is laid (only by 5 HC). Focus on deliveries is related either with curative care or child immunization, further there are no statistical correlations. Focus on deliveries could be interesting to take into account with further analysis.



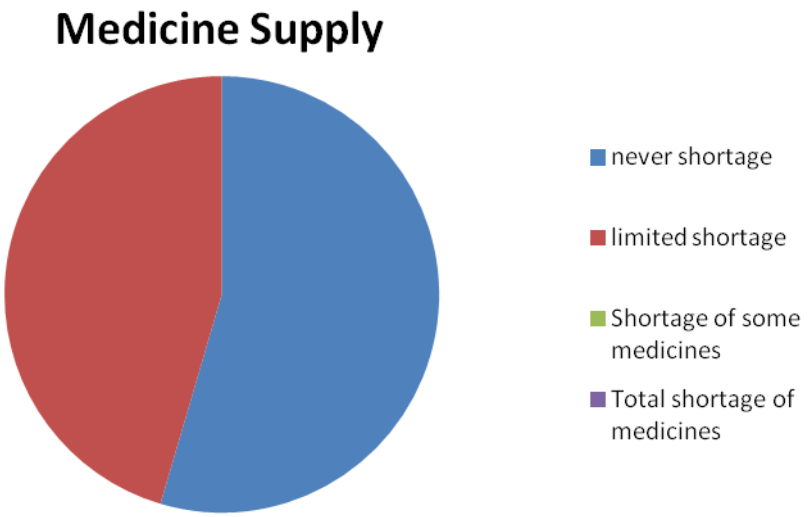
Question 4.3 (present instrumentation)

Although some exceptions, electricity, running water and a freezer are quite common in HCs, being present in around 40 HCs. Sterilization apparatuses is even present in 51 HCs (only in 5 not). For electricity, sometimes solar panels are used. Ambulance and an incubator are much more rare, only in 12 and 8 health centers and thus more interesting for further analysis, although tapped water and electricity could have some effect on strategies.



Question 4.4 (medicine supply)

Medication supply seems to be pretty good. In 30 cases there is indicated never to be a shortage, and in the remaining cases there is only sometimes a shortage. For that reason, this variable is not very interesting to analyze further.

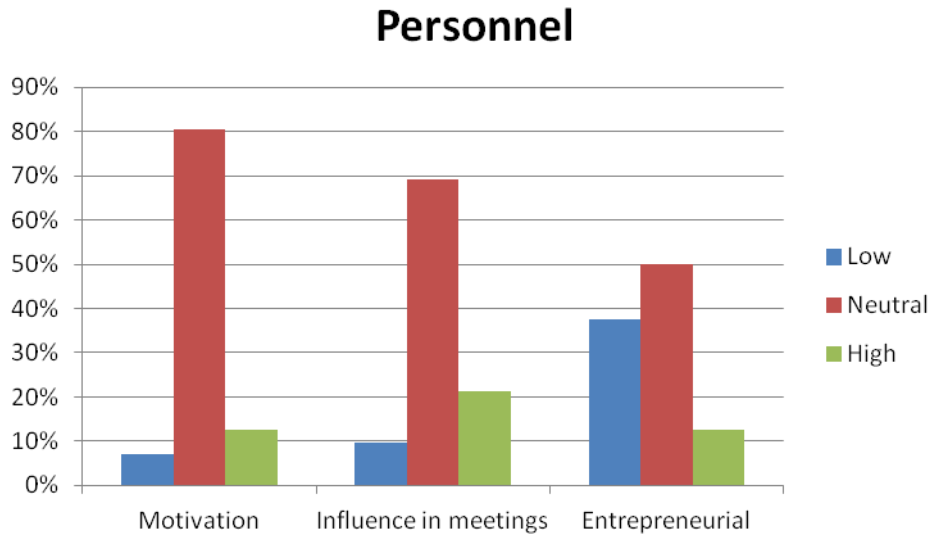


Question 4.6 (staff characteristics)

The motivation of the staff is most times indicated as medium. Only in 4 cases it is indicated as low, in 7 cases as high. The staff has only limited voice in policy, only in 11 HC they have much voice in policy; in 36 it is medium. Regarding the entrepreneurialism the 17 missing cases indicate that this

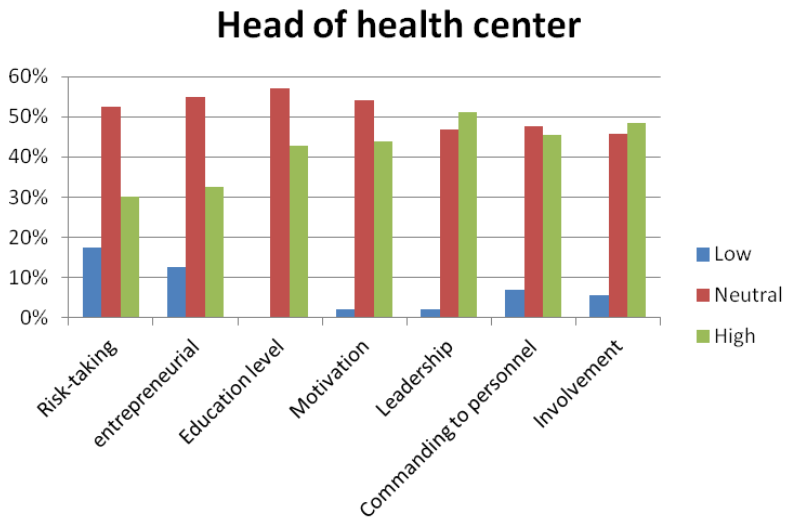
term was not widely understood. Therefore it can be questioned how reliable the answer on this question is. However, that 15 indicate it to be low and 20 as medium, shows some difference with most answered questions, indicating an understanding. .

Remarkable is that here often is chosen for the middle-option, where in previous questions mostly was chosen for the third option.



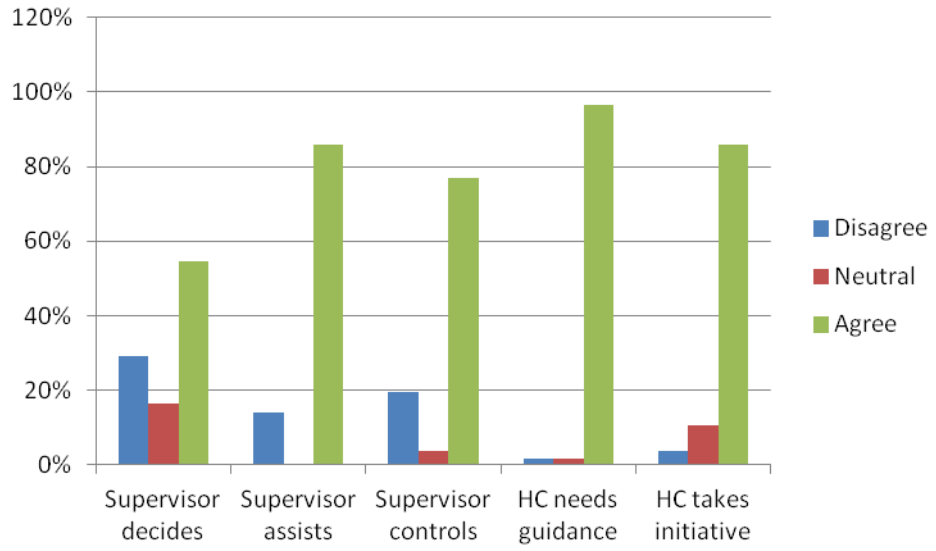
Question 4.7 (head of HC characteristics)

The questions about risk-taking, entrepreneurialism and involvement seem less well understood, since the many missing values (17-20). Others are answered, although some seem to have had a problem with giving their opinion about a specific person (8 missing values). Educational level, commanding personnel, motivation and leadership are quite evenly distributed among medium and high. This indicates limited dispersion, only risk-taking, entrepreneurism and commanding to personnel are possibly an influence and should be used for further analysis.



Question 4.9 (vision on function supervisor)

It is widely agreed that it is the role of the supervisor to assist the health center (86%). Whether they decide for changes (55%) or control what is happening in the health center (79%) is a bit more discussion. They do feel that the HCs ask for their guidance (97%), but in most cases they are also able to take own initiatives (86%). So for further analysis, mainly the decision and controlling power of supervisors are interesting.

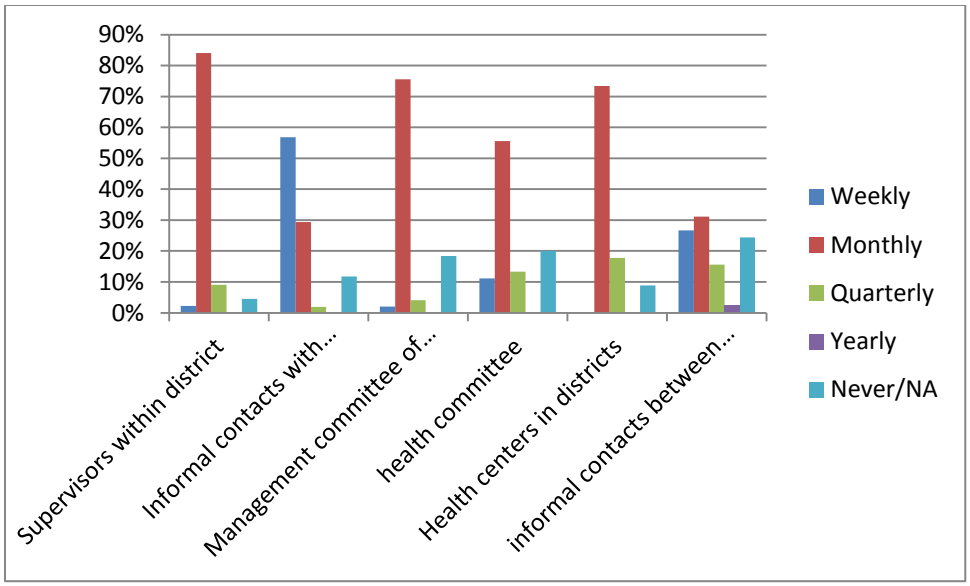


Question 4.10-4.13 (hierarchy/competition)

Possible to see some hierarchy. Spatial analysis.

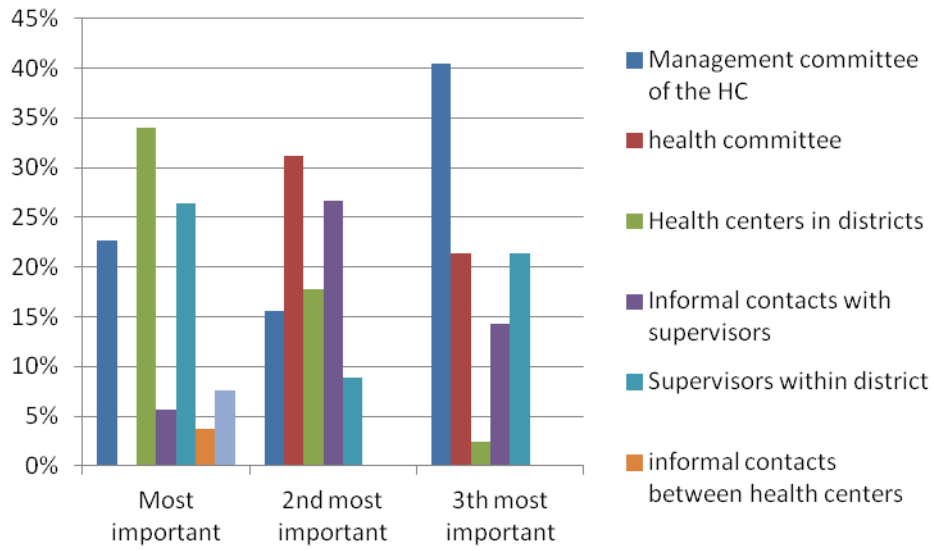
Question 4.14 (different meetings how often?)

Most meetings seem to take place monthly: between supervisors, of the management committee and between the health centers (>75%). About the meetings of the health committee there is less certainty, with 55% stating monthly, but also 20% stating never. It could be that the supervisors are not aware of this meeting. Informal meetings are more on a weekly to monthly basis, although 25% answers that there is never any informal meeting between the health centers.



Question 4.15 (importance of meetings)

The most important meeting differs between the respondents, but there are clearly three candidates. This is the meetings in the HC itself, meetings between health centers and meetings between supervisors. However, following out of question 17, in most cases it is a meeting on district level, but not entirely sure which of the two meetings is more important. As seen in second and third most important, the meetings on HC level surely also have an important place. Informal contact between HCs seems very limited in the importance, indicating that this will have not much of a role in any diffusion process.



Question 4.16

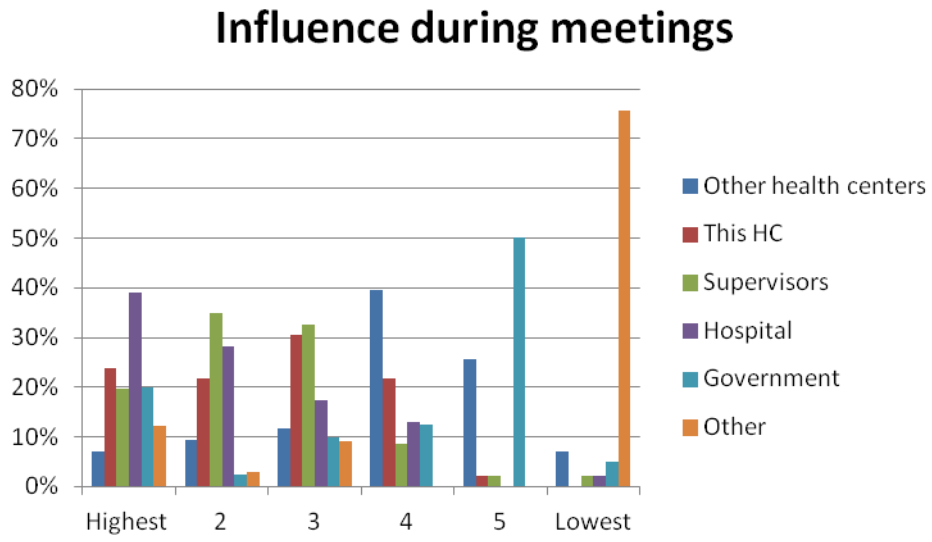
Almost in all cases, all HCs are represented, making this a less interesting question for further analysis

Question 4.17

Chairman of the meeting is either the hospital director or the head of district in charge of health.

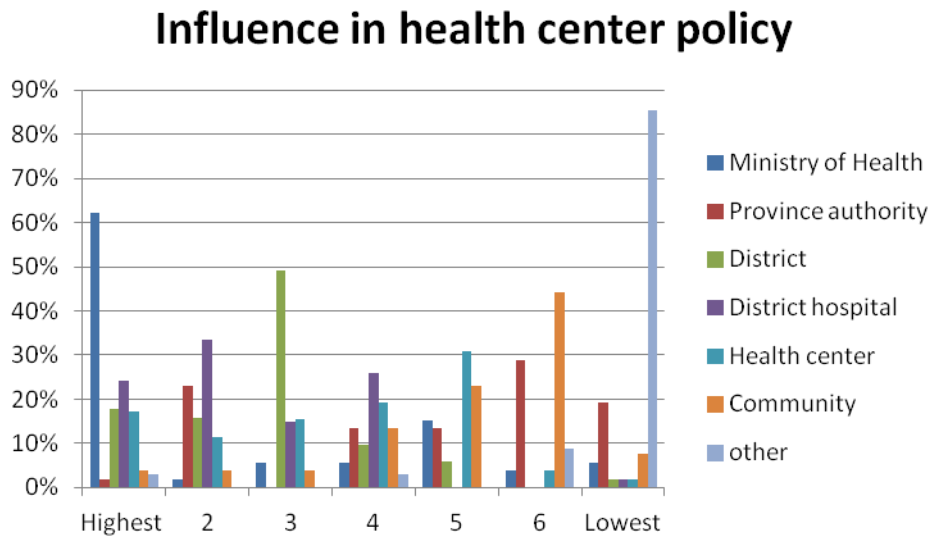
Question 4.18 (ranking the input during meeting)

This question sometimes caused some trouble to understand. However, when you make histograms of the answers, quite a clear picture comes out (even without dividing based on which meeting is most important). It seems that there is almost equal influence for supervisor, district hospital, health center and government. Other health centers and other bodies are not having much influence.



Question 4.19 (ranking influence in HC policy)

Most important is the Ministry of health, but also the district hospital and the health center have an important role in what happens in the health center. Perhaps there is some differences between health centers where MoH has highest influence and where most influence is by district or health center.



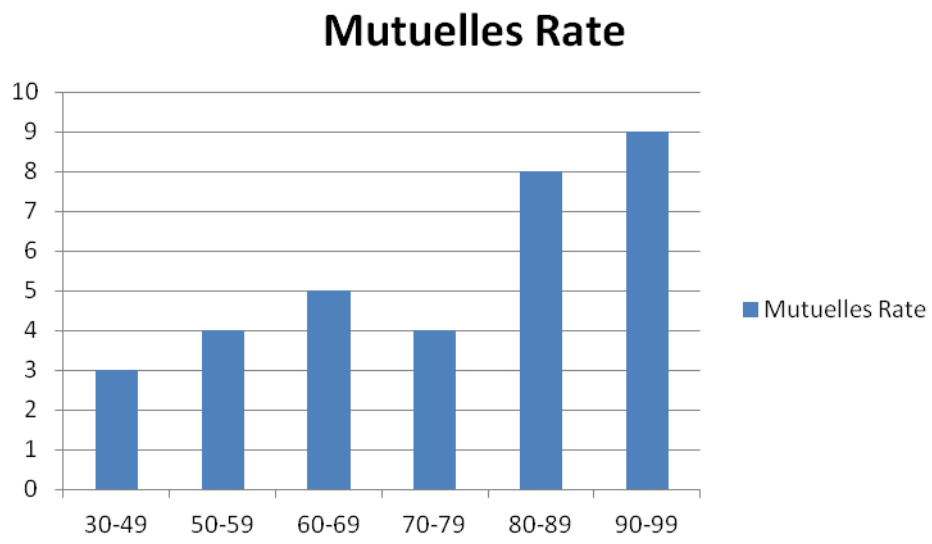
Question 4.20 (staff size)

On average the staff size is 21. However, some respondents seem to have only summed the personnel listed and not included other personnel. Therefore the answer to this question is not useable for comparing.

Number of A1 staff is mostly between 0-2, where the A2-staff is varying largely, but is on average 10. **These would be more useful to compare health centers on**. For number of doctors, there are only 3 HCs which hire a doctor.

Question 4.21 (Health insurance coverage)

The Mutuelles is varying widely, mostly between 50 and 100%. In most cases it is above 80%, but in some cases it is clearly lower.

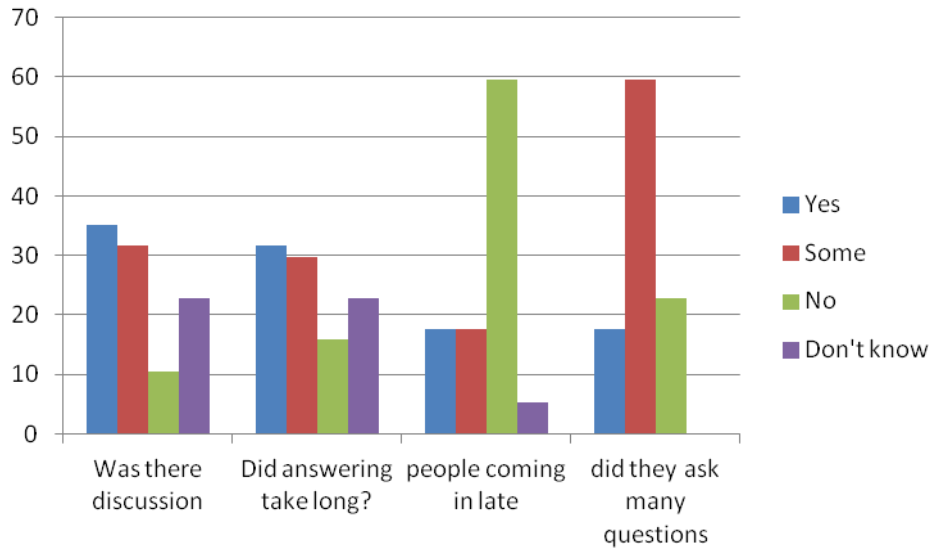


Question 4.22 (monthly number of patients treated)

Due to an error of my side, in half of the questionnaire this question has not appeared. Therefore this question is of less use for further analysis.

Heterogeneity in data collection

Most difference is in how much discussion there was, the time that it took them to answer the questionnaire and people coming in later. In most cases some questions were asked, only not when we were not supervising it. Effect of discussion and also how long they needed for the questionnaire, are probably most interesting to implement in further analysis (possibly also as an indicator for the culture?)



Suitable for end-report?

Health center Characteristic	Questions
Structure	1.1,
Strategy	4.2, 4.6.3, 4.7.1, 4.7.2 (2.1 – 2.5)
Size	1.2, 1.3
Resources	4.1, 4.3, 4.4, 4.5, 4.7.3, 4.7.7, 4.8, 4.7.4, 1.2, 4.6.1
Culture	4.6.2, 4.7.5, 4.7.6, 4.9.4, 4.9.5

Structure

The great majority offers all basic services and thus there are not much structural differences which can be included in the analysis.

Strategy

In strategy there are many differences between health centers. Focus of health centers differs and also the entrepreneurism and risk-taking have an important role. All of these are thus important for further analysis.

Size

Both for staff-size as patients treated there have been some problems, making this characteristic not suitable for analysis. Overall, it can be said that most health centers are quite similar in size and number of patients they can treat, although there are differences.

Resources

For the financial resources, there are only some differences in whether they receive from faith-based and/or insurance companies. However, about the amounts they receive nothing is known. Regarding personnel, in most health centers they neither highly appreciate them as they have problems. There seems really something to win on the personnel. For the provisions the health center has, medicine supply is good. Incubators and ambulances are quite rare, possibly depending on location or money available. And even electricity and tapped water is not present in all health centers. With solar plates, in many cases at least an electricity problem is overcome.

Culture

Regarding culture not really a clear image can be made. Probably questions were difficult to understood, but for example that heads of health center show good leadership but are also commanding to personnel raises some questions. For analysis, culture is for that reason not very useful. Perhaps best can be used the differences that were seen during the workshops (see last section, heterogeneity).

Environmental Characteristic	Questions
Political conditions	3.3.3, 4.19.1
Societal culture	4.9.1 – 4.9.3
Infrastructural problems	1.3
Competition	4.10-4.11, 3.3.2
Other	1.4, 1.5

Political conditions
Clearly can be seen that the influence of the government is very large, both in the adopted strategies as in the policies the health centers are making. This seems nation-wide to be the case, thus analysis on this is not very well possible. However, for extrapolation to conclusions for other countries, this is a very important fact.

Societal culture
From question 4.9 it can be deducted that the main role of supervisors is to assist. However, they certainly have a lot of influence and can make decisions on what is happening.

Infrastructural problems
In a great amount of health centers there are problems to reach this. This is partly infrastructural, but also has to do with the limited presence of means to come there, etc. This is interesting for further analysis.

Competition
Competition is quite limited, only in some cases people are stolen away from each other.

Communication Characteristic	Questions
Frequency	4.14.1-4.14.7
Hierarchy	4.17, 4.18.1-4.18.5
Culture	4.17, 4.18.1-4.18.5
Importance of channel	3.6, 4.15 (3.1.1-3.1.2)

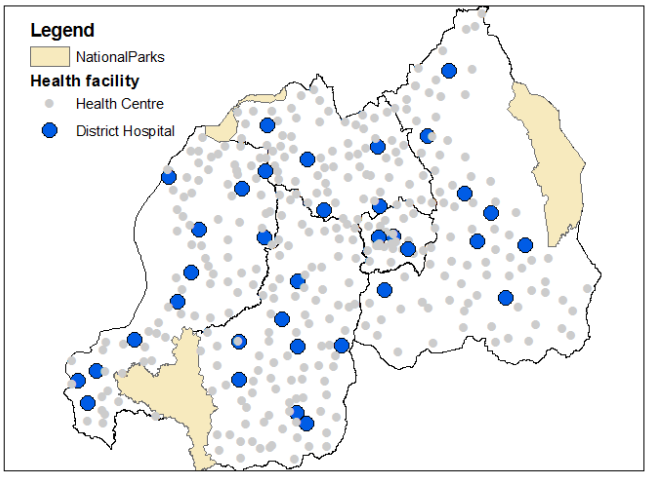
Frequency
Most communication is monthly. Only on informal basis, communication sometimes happens more often.

Hierarchy
Most communication seems to be formal, with a clear hierarchy. Either the district in charge of health or the head of the hospitals chairs the meeting. However, health centers seem to have sufficient input.

Culture
During the meetings, all are presented and all get the possibility to have their input in the meeting.

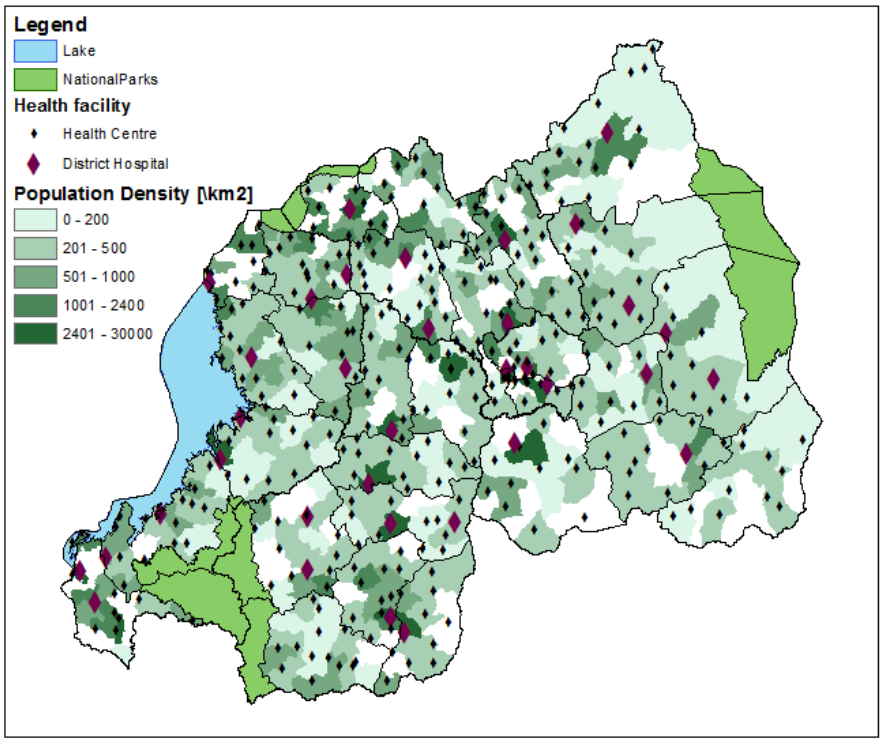
Importance of channel
Meetings seem to play an important role in the adoption and spreading of strategies.

APPENDIX VII: Extensive spatial analysis

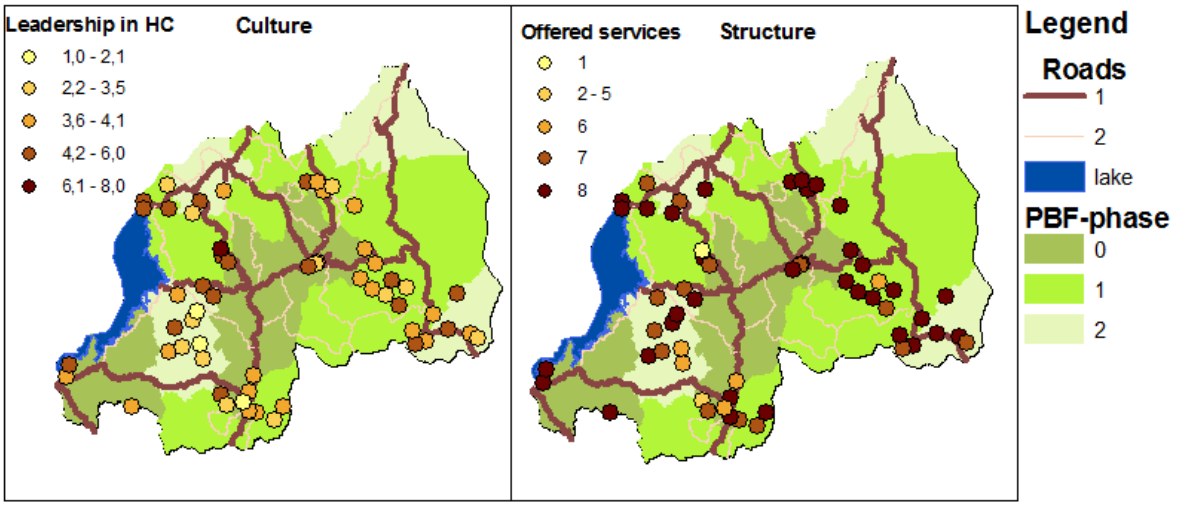


In this map all the health centers and hospitals in Rwanda are displayed. There are in general three areas which are not covered by health centers because of the presence of a national park or lake. In general the health centers cover Rwanda quite densely, although there seem to be some regions where the availability is lower (in the south of the Eastern Province, the east of Eastern Province and the east of Western Province).

Distance between hospitals varies, but on average the distance is 15 kilometers.



Here the population density is shown as a background variable. All white fields are missing values. It can be seen that in the cities it is more dense populated, but the density across the country is not that variable. However, the north seems a bit more densely populated. What can be seen is that the hospitals are in most cases placed in the most densely populated sector of the region.



In these maps the information about the health centers that have responded to the questionnaire is included. As can be seen all provinces are represented, although the Eastern, Western and Southern Province are better represented than the Northern. Because of the sample strategy of using circles and clusters, clearly most health centers are close to each other and some districts are covered, but many are not.

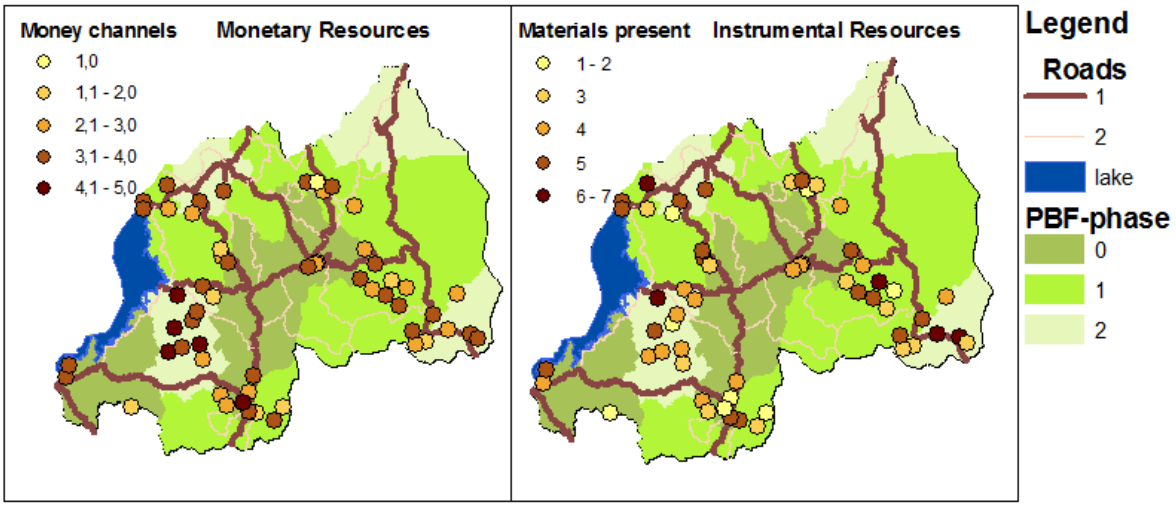
Also displayed are the asphalted roads (1) and the main unpaved roads (2). The different background-colors indicate the different PBF introduction moments. Phase 0 means that region was piloted (introduction between 2002-2006). Phase 1 is the first step in nationwide introduction, introduced in 2006. In phase 2 areas it has been introduced latest, in 2007-2008.

In the left map the culture is presented, meaning to what extent there is a strong leader and the ability of the health centers to develop own initiatives. In the north there seems slightly a culture of better leadership. There is not really an indication for influence of the PBF phase.

In the right map, the structure of the responding health centers is displayed. The darker the dot is, the more different kind of services are offered. What can be seen is that in the South there are some lighter dots, indicating that not every service is offered. There is no clear influence of roads or PBF phase, although most health centers close to the main road seem to offer all services.

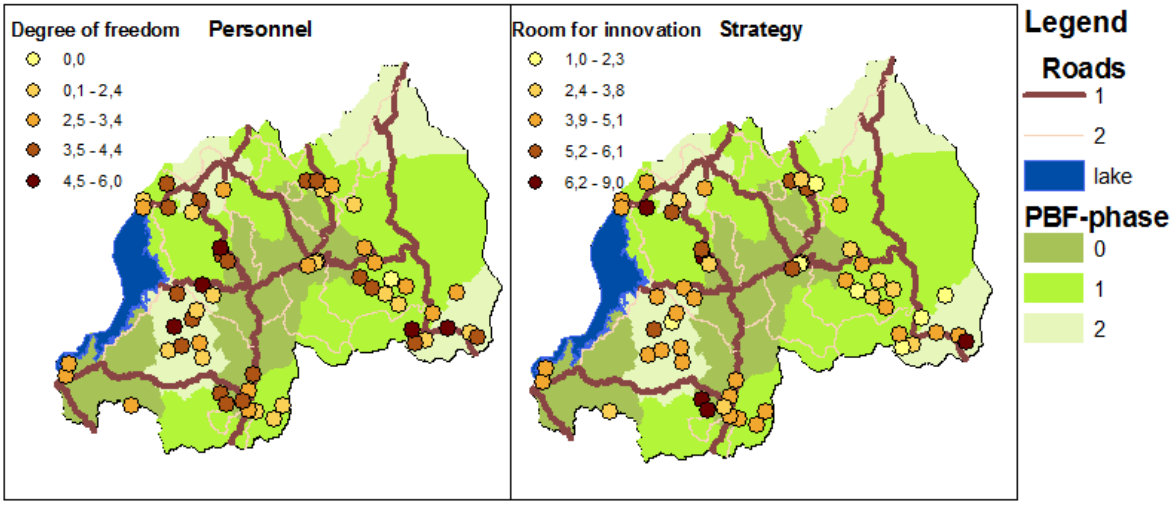
- **Testing with faith-based organizations?**
- **Any relation with resources?**

In the right map the strategy of the health center is shown. This presents a score for how much 'room' there is for innovation in the health center. In the east there seems to be less possibilities for this, compared to the South and West. **Could this be caused by difference in government influence**?



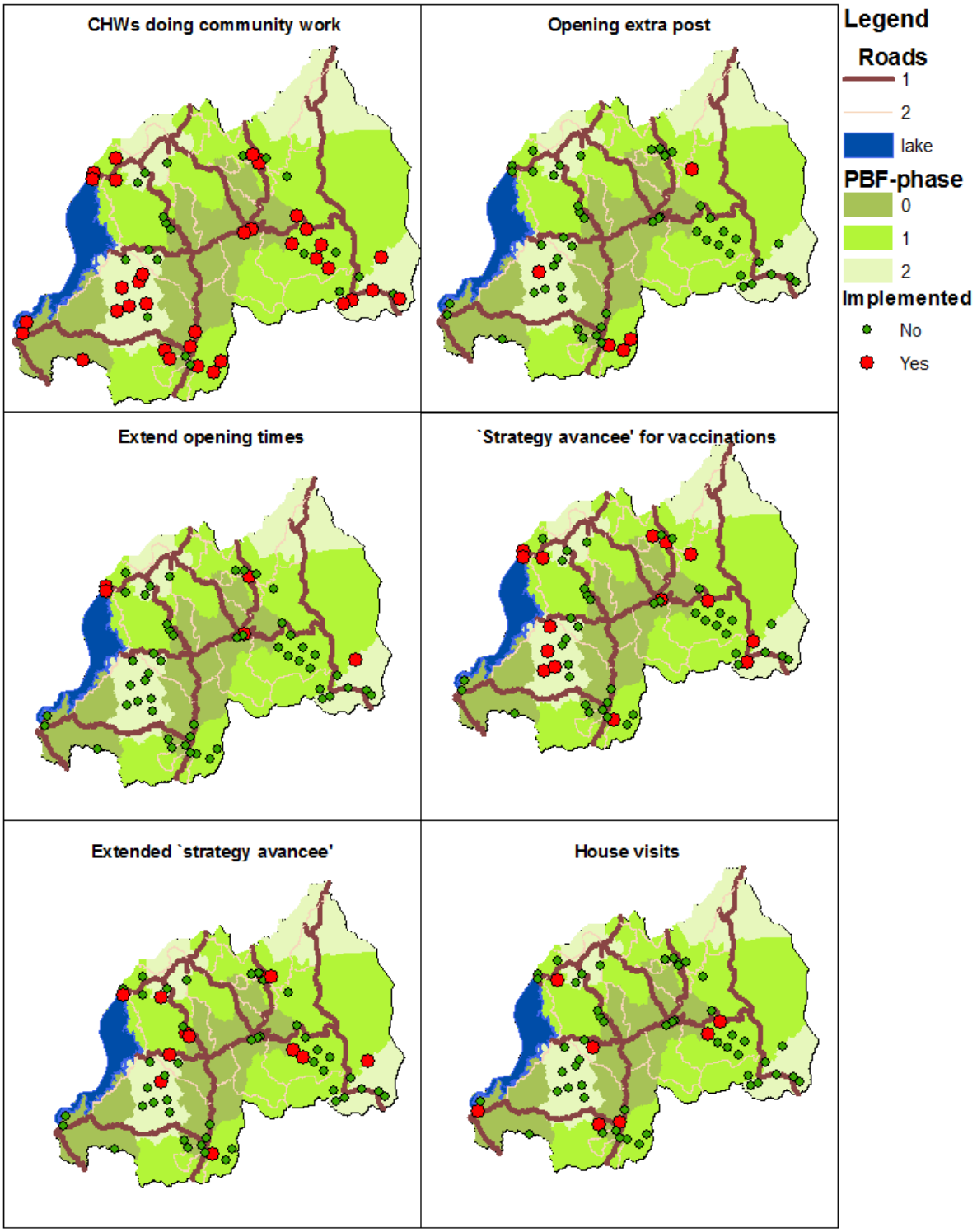
For monetary resources it is important to know that it means trough which channels money is received. It does not say anything about the amount of money they have. In the south/south-west, more channels seem to be used. **How does this relate with poverty?**

Regarding the instrumental resources of health centers there are clearly some differences, mostly within the regions. There are some which are clearly missing some resources; a bit more in the South then elsewhere. Remarkable is that there is no real relation with the closeness to the main roads, even though this could be expected, by facilitating for example medicine supply. **It could be interesting to see how much distance with the hospital matters.**



For the personnel closer to the main roads there seems to be more freedom for the personnel. Comparing it with the strategy they look comparable. However, both are without a clear relation with provinces or PBF phase districts.

Acces



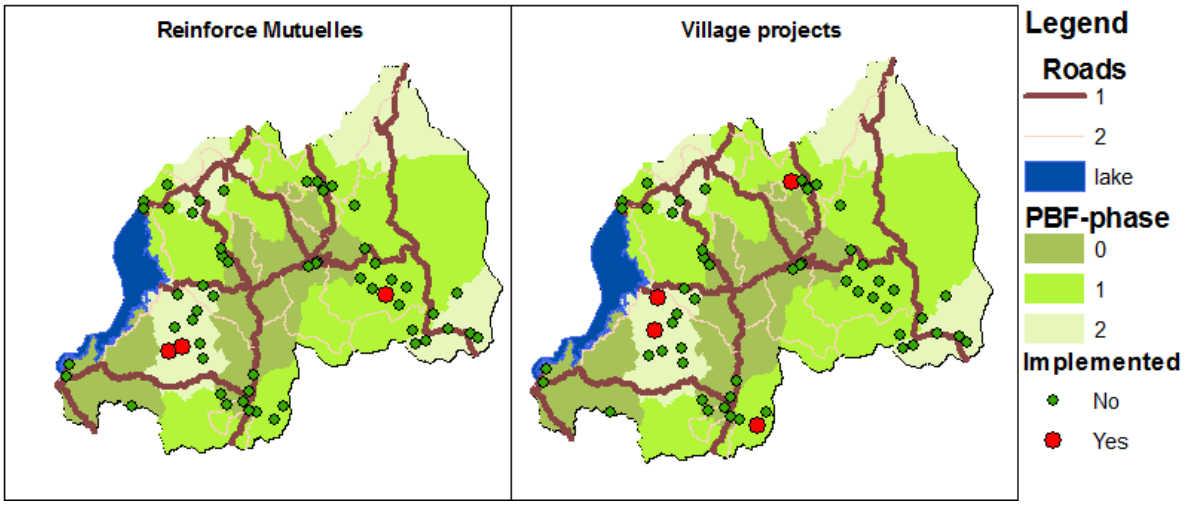
All the above displayed innovations are strategies to improve or increase the accessibility to care. Most important is the role of the community health workers. This is mentioned by the majority of the health centers. Only in the east of the Southern province, it looks as if these community health workers are not involved that much. The CHWs doing community work seems slightly better distributed in health centers that are not close to the main road.

Opening an extra post is rarely done, just as changing opening times. Remarkably however is that in the south three places close to each other have opened an extra post, and in the West two close health centers have both extended their opening times. What can also be seen is that opening an extra post is only done in health centers that are not close to the main road, while the extension of opening times is (almost) only done by health centers that are close to a main road. This indicates that when access is not very good, opening an extra post becomes interesting, while when access is good, extending opening times becomes interesting to serve people, probably from further away. **This could be due to possible access problems, but they also can have influenced each other in this.**

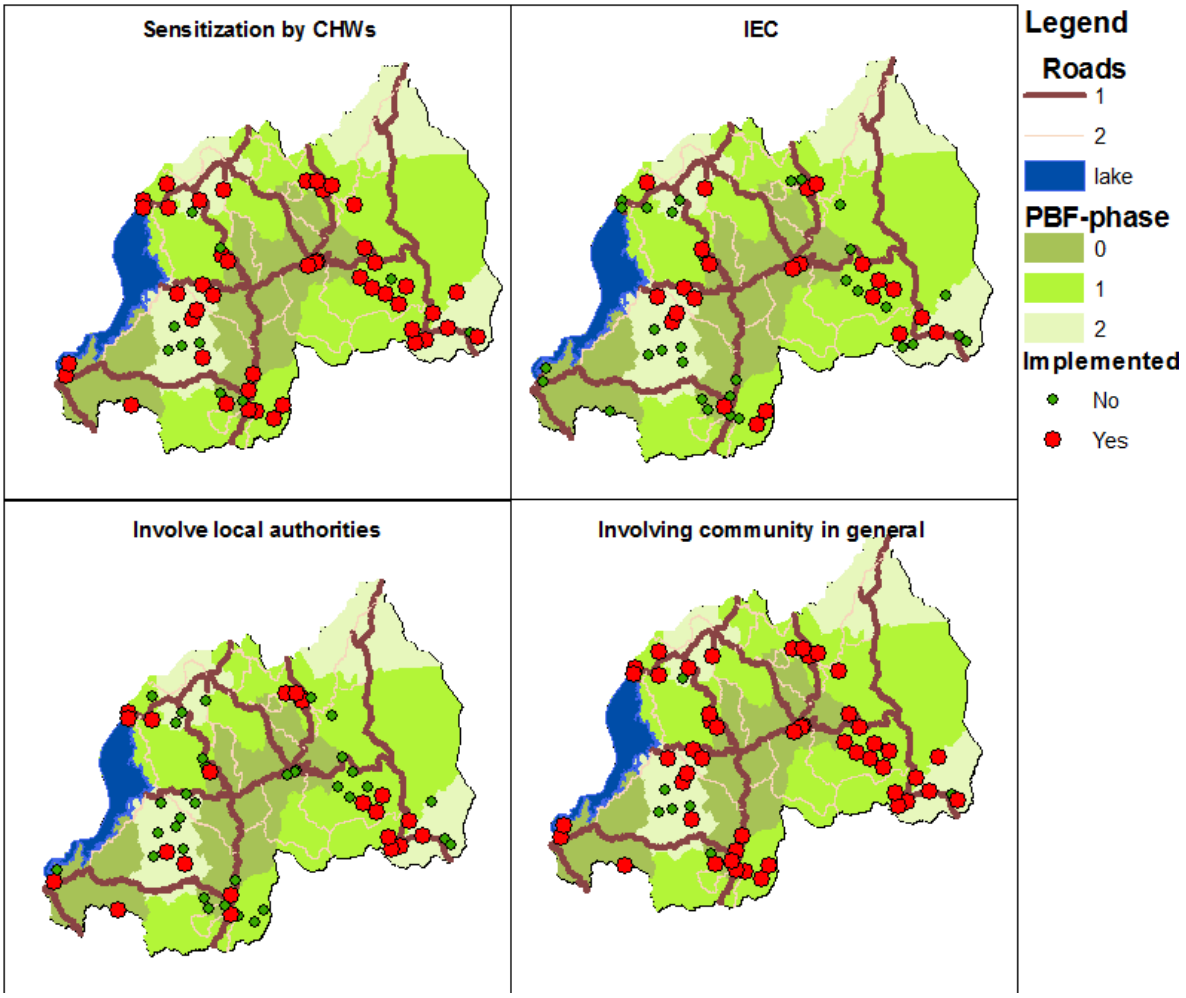
The 'strategy avancee' has started as a government initiative to reach all children in the country. As can be seen it is still used by many health centers across the country. Extending this strategy to use it not only for vaccinations but more general for providing health and care has also reached through the country. Remarkable is that it seems only to be limited to health centers in phase-1 and phase 2 areas. **With the knowledge of the interview I know it has emerged in a phase-0 area. From there it has diffused, probably the phase 1 and 2 are more open for other initiatives. Tracking this diffusion.** Another remarkable observation is that there are not really clusters, as would be expected with new innovations.

Also the house-visits are seen across the countries, but all those health centers seem to be close to a main road. Also are they all located in or very close to phase-0 areas.

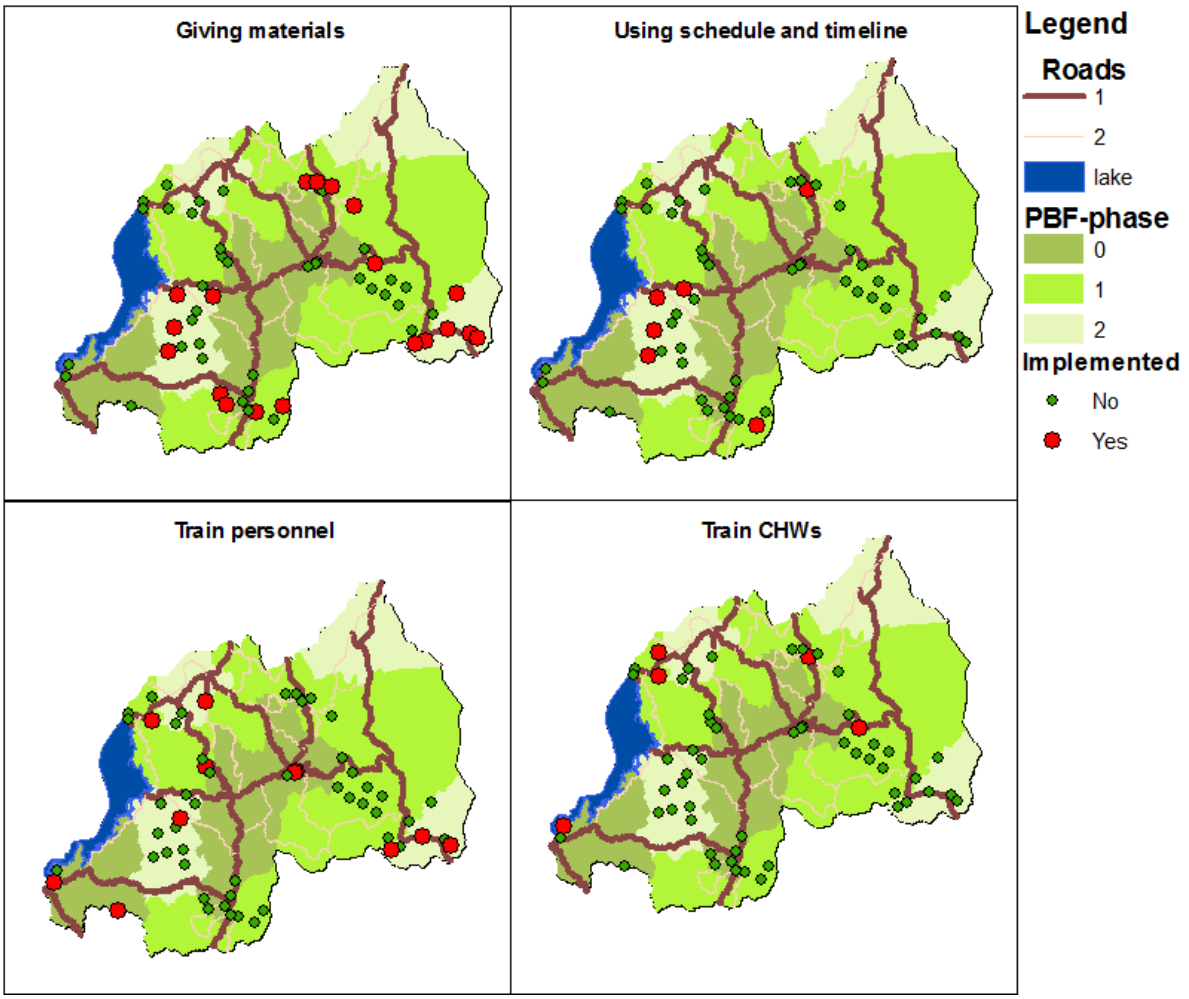
What can be seen in general is that all strategies but the CHWs are only used limited. In the capital none of these are implemented and compared to other provinces, the strategies are only limitedly used in the Eastern Province (**less hilly?).** Another remarkable thing is that there seems to be limited overlap between the adoption of different strategies by the same health center; most have mentioned only 1 or 2 of the strategies. **This indicates that the health centers choose between the different options to improve the access, instead of implementing several strategies (too strong conclusion perhaps..).**



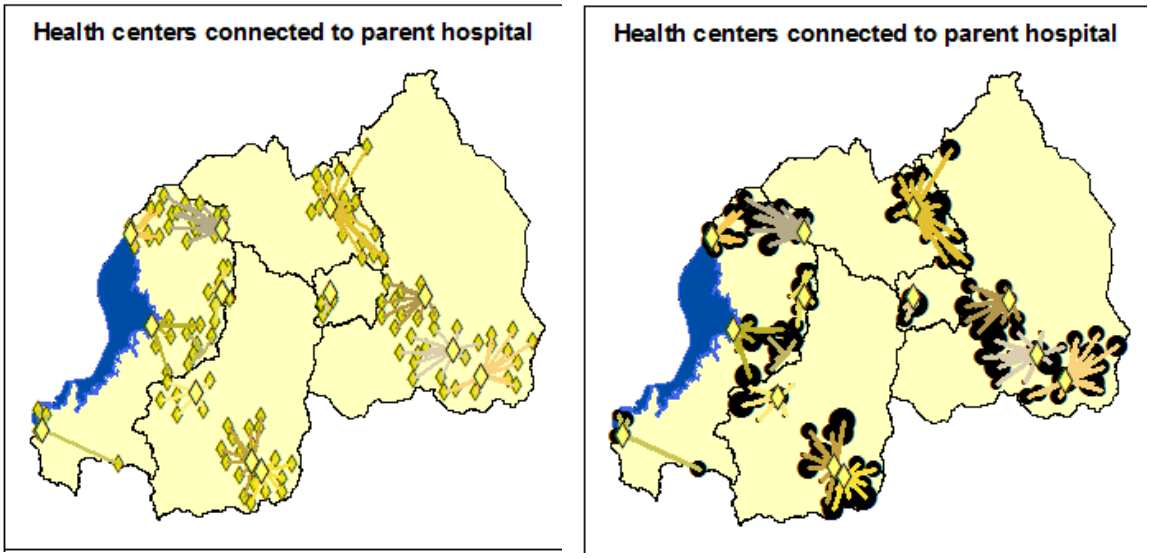
For equity it can clearly be seen that strategies are limited. Even in those small numbers, there seems to be some grouping of strategies, both in the South-West. **Perhaps there is some good sharing of strategies there.**



For involvement of the community most health centers use at least one strategy (right-bottom plot). Also here, the community health workers play an important role. Only in the South-West there is a cluster where it is not mentioned. Regarding the IEC (information, education and communication) the presence seems clustered. In the east there is clearly some more involvement of local authorities. Further there is no remarkable influence of roads or PBF introduction phase.



Strategies in other categories are various, but the most interesting are displayed here. Giving materials is clearly not used everywhere, but only in some regions (relation with some variable?). Possibly it is a government decision where to pay for this and where not (when looking at answers on questionnaire). Also using a schedule and timeline is only present on some places. Again the south-west springs out. Training of both personnel and CHWs is only done in health centers lying close to the main roads. Possibly this has to do with the fact that an external training has to come there, making good accessibility from far away a necessity.



The Figure above shows the district hospitals and the health centers connected to their parent hospital. What can be seen is that hospitals are often not located in the center of the cluster of health centers they supervise, but often more at the edge. The location is probably, as stated before, more determined based on the population density (or presence of towns). In the right map the hierarchy is also displayed. There is no clear relation in the hierarchy and location to the hospital.

APPENDIX VIII: Results interview categorized on topic

Nation-wide 1	N1
Nation-wide 2	N2
Nation-wide 3	N3
Nation-wide 4	N4
District 1	D1
District 2	D2
District 3	D3
District 4	D4
Health Center 1	H1
Health Center 2	H2

Role in HC system

D1:

In this function since the formation of districts in 2006. Before she was working in the proivince.

The function of the coordinator is to facilitate

- the implementation of government policies
- activities of the hospitals and health centers
- assisting in making annual reports etc

The facilities with which she deals

- district hospital
- Mutuelles
- District Pharmacy
- Health centers

Another role is that the district sometimes has campaigns to stimulate different things

D2: This function has been appointed by the MoH and has the goal to improve hygiene & sanitation in health centers, district hospitals, public places, schools and households.

Supervision consists of three phases. First he teaches how to improve hygiene and sanitation. In the second phase there is looked whether there is improvement (if necessary repeat the teaching). If after that there is still no improvement, punishment follows (both financial or closing the facility).

H1: Head of HC since 3 years. Responsible for coordinating all the activities and with the help of others monitor all activities happening in the HC.

D3: Job is to coordinate all activities in the health care system of the district. E.g. vaccinations campaign.
He's in this function for the 5th year now.

D4: His tasks are to supervise all administrative and clinical activities of the hospitals and health centers. It's a very informative functions, which embraces to analyze the needs of different actors, meet problems on many areas and also learn about the influence of the social strata, which results in differences in accessibility to health.

The Mutuelle is causing problems in this district, some people cannot (want not) pay the Mutuelle, but still the hospital and HCs have to treat them, resulting in loss. To improve this there is sensitization, and he suggests the government to take care for pooling for the very poor. There are already classes in the Mutuelles, evenly spreaded among the sector. Majority of sectors is uniform.

Strong points of this district are that it's quite rich because of tourists, fertile soil and at the border with DRC (lot of trade).

H2: Titulaire has the responsibility to coordinate all activities, and also to take part in consultations, attend to financial meetings, etc. In function for 6 months now.

Role in PBF system

N1: The work of HDP is covering the main area of the PBF intervention, and thus closely related with PBF. They have three objectives

1. Pool of PBF trainers
2. Providing technical support to actors for implementation
3. Auditing of the system as an independent organ

D1: She is chairing the district commission of PBF, which is once every trimester. On this meeting all HCs, district-level-organizations and partners are represented. Health centers are controlled and based on this the commission gives recommendations. In the next meeting it is evaluated how the HCs have dealt with these recommendations. So in these meetings it is tried to make strategies and serves also as a control/monitoring tool of the HCs

N2

- Organize PBF at central level, from Ministry of Health to district hospitals, health centers and community.
- Organize payments
- Organize trainings

Coordinate PBF activity in all levels. Coordinate the partners.

H1: Regarding PBF, for some activities they get some money, making the workers more motivated.

Some of the targets are not very good at the moment, they are trying to enhance them. One of the ways they are doing this is with a team of evaluation (QA-team). Before the PBF-control they control it and try to improve where possible.

N3: He has been involved with the implementation of PBF in 2002 in Gisagara, a pilot of PBF by Healthnet TPO. During the roll-out in the country he moved to province level to give technical support. Then he moved to national level, advising on health financing and more specifically PBF.

Now he is working for an international NGO. In the first project (2007-2009) was about the implementation of HIV-PBF. In the current project (since 2009) it is about integrated health system strengthening (component of WHO, consisting of 7 subcomponents). Subcomponents used here are helath information systems, health financing, HR-capacity building, decentralization and quality assurance.

D3: Relation with PBF is that he is the president of the PBF committee on district level. Also are the health-centers evaluated once every month a group is evaluated. Also there is an evaluation of (only) the titulaire, how they function.

H2: The health center has really been trying to receive more money (first 700.000, now 9.000.000).

Mainly because they increased their services delivered e.g. TB & prenatal consultations. They also have some programs now in which patients receive some money.

For the PBF money they use 75% for the personnel, and 25% for other materials, like equipment. For the personnel it is calculated with a distribution formula.

N4: BTC is involved in pilots and after that in a nation-wide implementation.

Opinion on PBF

Positive

N1:

+ The financing strategy of PBF is positive, it applies principles that are quite universal shared: who works harder, receives more

+ If well-used there are multiple effects, even beyond health. There is a culture change to work harder, to give quality service and pay attention to customer care

D1:

PBF has clearly influence on quality and quality of HCs. What we see is that the documentation has improved.

Also in the District Hospitals we see a large improvement, in quality and also in registration.

N2: There are many indicators, both for HCs and DHs. Because of those, they are trying to meet those indicators. Also it helps in the motivation

N3: It has changed the way how people work.

- Now documentation is way better.
- There is accountability
- There is more teamwork
    - More power is given to others
    - They understand each other better
- Spirit of innovation
    - They are no longer passive. Examples:
        - Giving incentives to mothers
        - Outreach into the villages
        - Reinforce link with community level by more collaboration with CHWs

D3: Even though it does not serve very much as motivation anymore, people still see it as beneficial.

The director can really use PBF to motivate people, it makes it easier to make them work (e.g. to work longer or in the weekend).

What he sees in the health centers is that customer care has increased

- Hygiene
- Customer care
- Everyday seeing patient to be better able to treat for everything

H2: PBF has an added value. However, the delaying of payments is really a problem. For the workers they would like PBF to be included in the salary so that they can tell the bank that they earn more.

Negative

N1:

- There is too much delay in payments. Herewith, the wrong example is given to the health centers how to behave to their patients
- Total amount for PBF is too low, funding could be more based on PBF

N3: MoH has already well established the system as national policy on different levels of the helath care system. During the pilot, they mostly focused on HC, but is now used everywhere. Seems to be regarded as some kind of 'magic formula'. This has also a downside, not everything should be solved with financial motivation (not always the right kind of motivation). More supervision etc. should also be considered.

D3: PBF was a good idea. However, it has some problems. There is the problem of implementation. It should also work on individual performance.

Now it has more become a tool of penaltilization instead of rewardance (it can be cut or reduced).

Neutral/other

D2: PBF has started well, has resulted in some improvement, but needs more follow-up. Now there is too much focus on the money. Not all indicators are covered, and health care tends to focus too much on TB, malaria and HIV. It should cover more indicators, for example by combining different elements in an indicator.

N4:

- In the hospitals the directors experienced the PBF goals as an instrument to discuss with the personnel. Because all activities were included, it give good insight in what should be done
- It motivated health workers (although demotivation is also possible. Different things this could be seen at
    - Working more hours
    - Being opened in the weekends
    - Demand for education (wiser distribution among employees)
- How was subsidy divided? They should implement this themselves, leading to good discussion and possible reflection
- Auto-evaluation: There was more place for reflection and team dynamics

List of innovations

N1:

1. Hiring more people from the extra money (mostly in rural areas, where the ones who were assigned to that health center were not showing up).
2. Giving incentives for staff (even though government supports it, it is up to the HC itself how to use the money, but it is often used as incentives for staff)
3. More conscious decisions are made for who needs what training etc.
4. Reduction of cost for deliveries, to lower the threshold for women (not possible anymore, because of Mutuelles, fixed prices everywhere).
5. Give a gift (e.g. clothes) when a woman delivers in the HC
6. Contact the traditional midwives to stimulate them to bring woman to the HC (for some small money) instead of performing illegal practices.
7. Provide incentives for the health center committees, so that they would work better
8. Providing community health workers with something of incentives (used to be volunteers). This is adopted by the government.
9. From the health centers there came pressure for more regular and standardized supervision. Because of that, coordination meetings within the district hospitals are now the case.

D1: In health centers strategies are being developed. Before the community-PBF, CHWs were motivated by some money to bring children to vaccinate and also pregnant woman. Now we can see that health centers recruit extra personnel to improve quality, that's how they decide/choose to use the money.

Another example is a strategy for family planning. Poor families with many children are identified and these are visited

Strategie avancees

Initially this has been a government strategy to reach everyone for vaccination. The district has adopted this and is using it now for many things, e.g. family planning. Also, instead of some fixed points, they are now able to reach all cells.

N2:

Health centers show some innovations

- Family planning: opening posts in target zone (if faith-based organization
- More order in documents
    - Improvements, both in working harder and innovations
- Offering maternity care
- System for motivation of mothers

H1: Improving in prenatal consultations, deliveries of HC and the follow-up of pregnant women.

How is this done? District has ordered the local leader to make sure more woman visit the health center, otherwise they can receive a fine.

However, they are very good in customer care

With support of another organization (Inbutal) they have installed two people for counseling HIV+ woman (mainly pregnant ones), providing them with specialized care. They were selected because they used to receive a high percentage of HIV+ woman. It was a government initiative with Inbutal providing the staff and also helping in the working & supervision of the staff. However, funds have stopped, so no specialized personnel anymore, but still they use what they have learned.

Would be recommended to (essential for) all health centers, but most have lack of personnel, and lack of funds to let them come to this HC to learn it.

They also have an orphanage with HIV+ children. Here every year some german volunteers are coming to help. The HC prevents here/deals with the malnutrition.

N3: Spirit of innovation

- They are no longer passive. Examples:
  - Giving incentives to mothers
  - Outreach into the villages
  - Reinforce link with community level by more collaboration with CHWs

D3: There is a coordination meeting every month in which they share their experiences. **Every three months the health centers that perform very well have to present how they are achieving this.**

D4: Would like to go a step further, by giving e.g. clothes to the babies. (is not yet there)

Another, existing, initiative is that every day all health centers have to report about delivery. This has to be done in any way possible (internet, SMS, phone, etc.). To decrease the high mortality rate of mothers and children.

H3: Mainly because they increased their services delivered e.g. TB & prenatal consultations. They also have some programs now in which patients receive some money.

Origins

N1: What are the origins of this innovation? During piloting phase, suggested by the NGO. It was up to the health centers themselves whether they would accept it or not. Feedback meetings were the most important channel for communication (health center and contractor), in which the goals of the business plan were evaluated.

N1: In health centers strategies are being developed. Before the community-PBF, CHWs were motivated by some money to bring children to vaccinate and also pregnant woman. Now we can see that health centers recruit extra personnel to improve quality, that's how they decide/choose to use the money.

D1: Initially this has been a government strategy to reach everyone for vaccination. The district has adopted this and is using it now for many things, e.g. family planning. Also, instead of some fixed points, they are now able to reach all cells.

D2: The improvements in HC are mainly from the MoH, and the supervisors trying to challenge them. Improvement comes from central. The MoH meets with the DH-directors to discuss what needs to be changed. Based on this, policy is written (in the form of guidelines). These guidelines come to the district level. Here they decide how to deal with these guidelines, normally implemented in checklists. Then the supervisors make sure this policy comes into the health centers and give it also follow-up.

Since he finds that the governments checklist are not able to cover everything, I have designed own checklists/questionnaires. Although unofficial, it helps to improve HC further.

H1: With support of another organization (Inbutal) they have installed two people for counseling HIV+ woman (mainly pregnant ones), providing them with specialized care. They were selected because they used to receive a high percentage of HIV+ woman. It was a government initiative with Inbutal providing the staff and also helping in the working & supervision of the staff. However, funds have stopped, so no specialized personnel anymore, but still they use what they have learned.

N3: Most of this came from the health centers. Often there was pressure from staff, but the leader/management had to implement it. Therefore, differences in leadership are very important and result in differences. Strategies emerged because each facility tried to analyze what were problems and how to solve them. It was difficult to formalize this, because each health center dealt with different problems. This was mainly the first year, after that staff became satisfied and no further initiatives were taken.

To overcome this, in some health centers business plans are used, in which there are fixed targets and is thought how to reach that. A possibility for PBF would be that targets change every year (based on what's possible), so that they have to be innovative to earn the bonus.

D3: When some department of the health center is not scoring well, they have a meeting to see and measure why it is not going well.

D4: He heard of this initiative via the Health centers.

This has been initiated from the MoH and via the DH been implemented at HCs. For this, both internet and meetings have been used.

H2: Mostly from the ministry of health.

Attributes

N1: Relative advantage is that they find ways to support patients (+ they think more from that perspective).

It is very compatible, who works more, receives more, and because the results were highly observable it was really a success.

N3: Feasibility is most important, after that the relative advantage

Communication Channels

N1: Health center committee is representing community. There are representatives from cell-level, representatives from the teachers, community-based-organizations, civil-society-organiations, religious organizations and the one in charge for social affairs at sector level. The meetings are like a general assembly. Is once every quarter. They have some decision power.

Other meetings are coordination meetings

Meetings between supvervisors depends on hospital & leadership (mostly depends on individuals).

D1: Every month there is a coordination meeting, in which much of the strategies is shared and discussed.

D2: Strategies mainly diffuse via meetings. There are a few regular meetings

- Weekly at sector level with local leaders (not only for health)
- Monthly meeting at district level, also not only for health
- Monthly meeting at district hospital
- Monthly meeting at sector level on health only
- Each trimester a meeting with the district coordinator

Relationships between health centers is mostly during meetings, but sometimes by phone

N2: There is a website about PBF. Also other kinds of communication, e.g. email. Contact with focal points in hospitals (PBF-supervisors)

D3: There is a coordination meeting every month in which they share their experiences. **Every three months the health centers that perform very well have to present how they are achieving this.**

Health center Characteristics

N1: Health center characteristics did not influence a lot, more the kind of people working there.

D1: It depends on the health centers themselves what they do and what they do not, they are not obliged. Differences between health centers depend mainly on difference in financial resources and how large the need to improve the quality is.

There are in this region some health centers in which it has been introduced in 2006, others in 2002. However, these have been able to catch up quite well. All health centers have made effort to improve quality and quantitity, which for example is shown in that they began to offer more various services (FP also in HCs associated with the church)

Global Fund is funding (partly) all HCs of Huye, salary is coming from government through the district. Global Fund is not involved in policy making.

D2: He's a health officer for 6 years, first 5 years in Gitwe hospital and now 1 year hear. Differences between hospitals he sees are administration and leadership. For health center important differences are leadership style and the level of education.

Differences between health centers are limited. Only the health centers related to church provide only natural family planning. (combine HCs for family planning or hospital sends someone)

N2: What kind of innovations is introduced, mainly depends on focus, possibilities they have. Mostly internally arranged.

They take strategies according to challenges. Since they differ between health centers, not very much sharing of strategies → sharing doesn't exist.

N3: There are large differences between Faith-based organizations (FBO) and public HCs. First the FBO were performing good, because of clear rules and good infrastructure. However, it seems that PBF has had less effect on them, they were not trying to take initiatives like working in the weekend, family planning, etc.

The HCs with better resources at the start of PBF have been better able to anticipate and change on PBF-changes.

In the 2nd phase the introduction was much easier, could be built on past experiences. Also developed strategies were shared, so they really benefited on the experience.

D3: Differences between health centers are in their service delivery and customer care

H2: Strong points:

- Large population (thus many patients)
- Strategic place, close to the road
- Workers stay here, not as in villages where there is a high throughput
- Have residence houses for their workers
- Near to the hospital
- Always working electricity, water and internet.

Environment

D2: A strong point of this district is the high pressure to take health insurance. If people don't have it, district/sector services are neither provided.

There are different partnerships, with PHP, IPRA, global funds (not for all HCs).

There is a lack of stability in the personnel making it difficult to develop

It is a very large district, making it much more difficult to control and communicate in it.

N2: There is not much difference between the districts and provinces in the scores. There is one set of indicators, and no regional differences.

N3: First there was competition between facilities, mainly for preventive activities. They did this close to the border so that people from the other sector would also come (immunization, growth monitoring).

Exchange is more on hospital level, through the peer-review (visiting other hospitals with a group).

At the district, during coordination meetings, it is tried to share between health centers and also through supervision some sharing could be done. However, does not know any research about this.

When rolling the strategy out on national level, there was an intervention and control group. Already then, some strategies developed in the intervention group were adopted by the control group.

Differerences are mainly between districts, not between provinces. Differences in leadership, involvement of hospitals and attitudes of steering committees.

Competition mainly based on geographic access.

H2: EGPAF/USAID is their partner. They used to work together even before PBF, is really an advantage if they need some equipment etc, they receive it easily. Therefore they can deliver high quality services. Also they receive some technical supervision from the organization.

They also receive some support from the MoH: offers for woman who came to deliver (clothes, water-sanitation, soap, mosquitonets). Government also helps with recruiting personnel.

MoH does a lot for the health center and the initiatives. Thanks to the effort of the government there are more women giving birth at HC and hospital.

IThanks to there partner they also take own initiatives, like a new fence.

N4: Rwandan context is also important: zero-tolerance on corruption + contracting in other areas.

Balance of power

D1: Policy making is really done at central level. The district level bears responsibility for the implementation of this policy. Regarding influence, the middle layer in the district (thus district, with technical supervision of hospital, mutuelles and pharmacy) are very important.

Province is trying to get more influence in health, by coordinating the administrative districts. Coordinating activities as annual reports and meetings per trimester.

Experiences between districts are shared via a forum and meetings per trimester. Example of something being introduced first in Karongi, is that families weekly pay a small amount of money so that they help each other to pay for the mutuelles. Groupes really formed on village level.

N2: Central level visits the DH, DH visits HC. Based on this, recommendations are given, since the main target of CAAC is to advice.

Main work is done by HC personnel. Therefore they have most influence on the results of Health care in Rwanda.

D4: Titulaire decides most what's going on in a health center. They receive recommendations and policies from district, who receive it from their turn from the ministry.