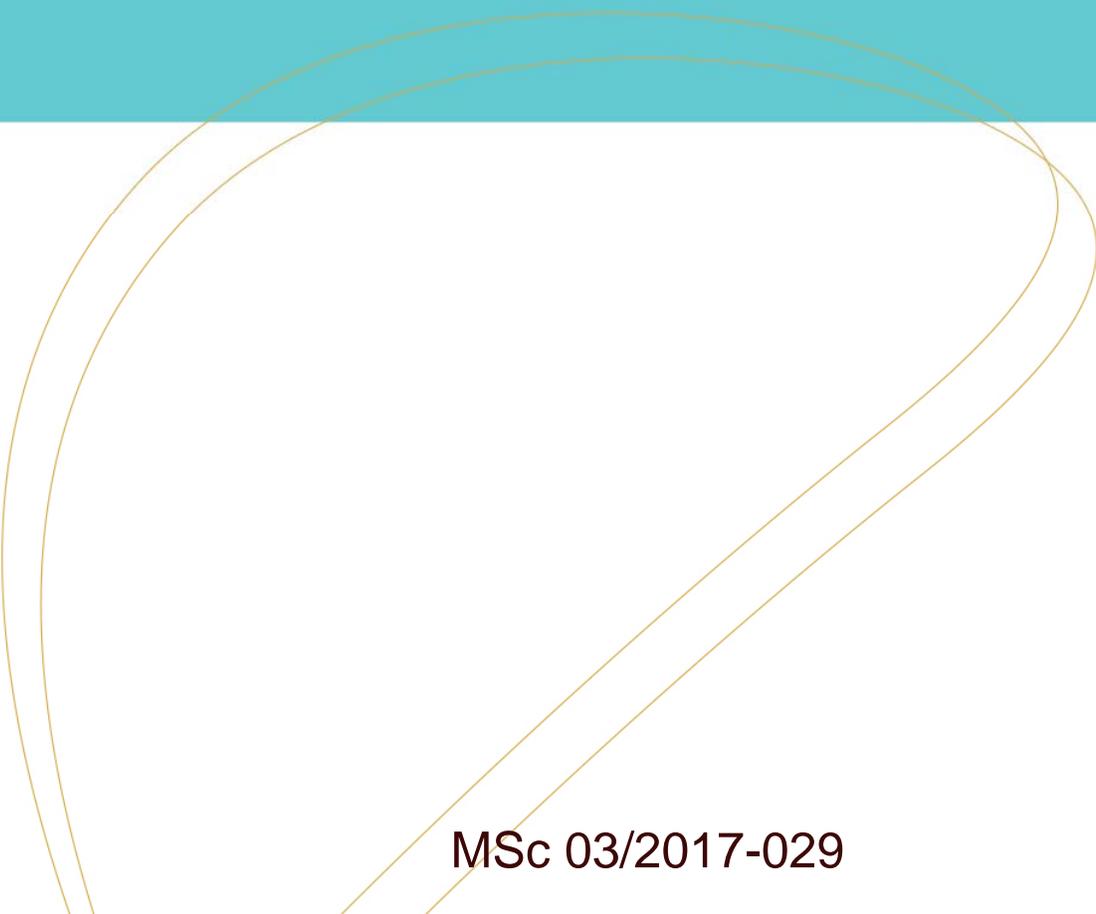


The determinants of high quality
of care in Long-term Care
Facilities in the Netherlands
in 2014

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*The determinants of high quality of care in Long-term
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ABSTRACT

Introduction/Background The quality of care in Dutch long-term care homes is currently a big source of concern, several reports from healthcare monitor institutions have already been written to gain more insight into what this quality is. The nursing homes are blamed for having too little attention for the long term care patients. A solution for this could be to decrease the amount of patients per nurse. Therefore more nurses need to be hired. However, the long-term care facilities already have to cope with a low budget, and have to use their funds as efficient as possible. This research focusses on determining both whether or not more nurses have a positive effect on the quality of care, and what kind of effect efficiency has on the quality of care.

Methods The data used for this research originates from datasets that are made public by “Zorginstituut Nederland”. The datasets include both data about nursing homes’ finances, labour and production, and data about quality. The Quality is grasped by use of the CQ score, which is a measuring instrument that is point of discussion in the Netherlands. Because we want to improve both quality and quantity, the effect of the input variables will be analysed with two linear regressions, one on a quantitative outcome, and one on the CQ Score. Followed by the linear regression is the Data Envelopment Analysis (DEA), which shows which nursing homes are the most efficient in producing a combination of the quantitative and qualitative output.

Results Of all the variables, only the amount of capital had a significant, in this case negative, effect on the quality of care. The data on the CQ score showed that there is little variation on the score between the nursing homes. The regression on quantity of care had three significant relationships, which were ‘Capital’, ‘Budget’ and total ‘personnel cost per FTE’. These effects were all positive. The results of the DEA showed that there are three nursing homes on the frontier, the other results are displayed in a top ten of most and bottom ten of least efficient nursing homes. Main result is that the quality of care is not affected by the inputs, and has also no significant relationship with efficiency.

Conclusion Based on this research, we cannot say that more input and a higher efficiency have an effect on the quality of care as there are no significant relationships between these variables. However, it is questionable if the data on which the results and conclusion were based on are valid. Both the input and quality data are subject of discussion. Further research is necessary, and a new measurement of the Quality of care is essential to help improve the quality of care in the Netherlands.

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1. Introduction

Insufficient Quality of Care in Dutch Long-term care homes.

One of the biggest economic issues that The Netherlands is facing in the 21st century, is the problem of their ageing population. The population gets older, and at the same time birth rates drops. Thus, the relative number of the younger and working people that have to take care of and pay for the older people is shrinking. This problem results in questions and uncertainties for economic and health care experts. (Achterberg et al, 2010). Financing of elderly care becomes more difficult, as the working population shrinks relative to the growing amount of retirees. Therefore the necessity is present to stimulate the providers of care for the elderly, the long-term care homes, in producing care as efficiently as possible. After all, the main available resource: 'labor' is becoming smaller and should be used in an optimal way (Smid et al, 2014).

On top of the need for efficiency, the quality of the care given in nursing homes is a growing source of concern among people in the Netherlands as well. A report of the Dutch Healthcare Inspection (IGZ), that was released in July 2016, claimed that a couple dozen of Dutch long-term care facilities did not prove to be capable of providing the desired quality of care (NOS, 2016). An explanation for these low qualities of care might be that the workload for the personnel is too high. A solution would then be to increase the amount of nurses per patient. This solutions seems logical, and there is indeed evidence that more nurses per patients can increase the quality of care. Previous research has shown that for nurses in acute care hospital, more nurses, and therefore less workload resulted in higher quality of the care. Especially because the nurses forgot less tasks. However, acute care might be more stressful and therefore these results do not necessarily correlate with long-term care. (Sochalski, 2004).

“Scherp op de Ouderenzorg” is an example of a Dutch initiative that tries to create extra support for more nurses per patient (Scherp op Ouderenzorg, 2017). Criticism on this movement however states that for meeting their suggested standards, the Netherlands would need almost 115.000 extra nurses. And it would be impossible to train such an amount of nurses on short notice. On top of the unavailability of extra nurses, even if it was possible to hire 115.000 nurses, it would cost an extra 2, 7 billion euros, which is a budget increase of 30% for elderly care. Furthermore, there is no scientific proof that increasing the input with such a number will mean that complaints of quality of care will decrease (Van den Oever, 2016).

In order to collect scientific proof, research about the relationship between quantitative inputs and the quality of care is key. However, the measurement of quality is not so straightforward. The question is, what is high quality of long-term care and how can you capture this quality? Earlier studies have of course already been performed to research the relationship between inputs and quality, this previous research has shown that there is a positive relationship between the amount of nurses and the quality of care. (Harrington et al, 2000) (Bliesmer et al, 1998) (Zhang et al, 2006). However, all these researches have different ways of measuring the value of quality of care. They use for example functioning of the nursing home resident, or the amount of extra use of a catheter, as a quality indicator. Most studies based on quality of care in nursing homes use proxy values such as these. Studies that focus on the relation between efficiency and quality of care in nursing homes also tend to use values such as for example, the amount of nurses per patient, as a quality score (Laine et al, 2015). However, this is no direct quality data.

In this research however, I have access to quality and quantity data for all nursing homes in the Netherlands. That is what makes this thesis interesting, as there is one specific quality score (CQ Score) that has been used to estimate the quality of all nursing homes in the Netherlands. The CQ score is initially designed to help individual nursing homes with gaining insight into which aspects they can improve, and also to help potential patients to choose which nursing home they prefer. However, because of the fact that this score is estimated for all nursing homes in the Netherlands, I have the possibility to research this score in relation to the other characteristics of the nursing home. This allows for comparison between nursing homes, and could give insight into what other characteristics are important for increasing the quality in long-term care.

The quality is in this thesis captured by the consumer-quality index, which in the past has been called “a good basis to investigate the quality of nursing homes” (Triemstra et al, 2010). However, the validity of this quality measurement tool has also been questioned several times (Zorgvisie, 2015). In this thesis I will also focus on how informative the CQ index is in revealing differences in quality of care across nursing homes.

On top of the possibility of increasing the amount of inputs, it is also important that the resources that are available for long term care are used as efficiently as possible. Interesting to see is whether realizing a higher efficiency has an effect on the quality of the care. And because there seems to be a general consensus that more nurses could improve the quality of care, the question is whether that is really the case for higher levels of input? Furthermore, it is important to see how and from which inputs the quality of long-term care benefits the most. In order to be able to answer these questions, input and output data of all nursing homes in the Netherlands will be analyzed in this study.

Objective & Research Questions

The aim of the research is to find answer in what can be done to improve Dutch nursing home facilities. Specifically, I am interested in quality: do nursing homes with relatively low inputs per patient indeed have a lower quality of care? Furthermore, this is an explorative study, in the sense that an important aim of the study is to explore whether publically available quality information is suitable for this purpose and whether it can be used to say something about actual quality differences among nursing home at all.

Nevertheless, things that can hopefully be concluded based on the available data are, which inputs are more important for the quality? And which inputs are less important? It is for example interesting to see whether or not the amount of nurses per patient is really the determinant of differences in the quality of the care. Furthermore, considering the public call for more nursing, it is desirable to know if increasing a certain important input could also directly improve the quality. With answers to these questions it might be possible to provide the long-term care homes and policy makers with recommendations regarding the aspects of care that they should at least lay more focus on. Therefore this study will be guided by the following central research question:

What are the most important determinants of quality of care in long-term care homes?

In order to answer this question, more information of these determinants is required.

Therefore, the following sub-objectives are formulated:

1. *Is there a positive relationship between quantity of inputs and quality of care?*

2. *Are there efficiency differences in terms of quality of care between long-term care homes?*
3. *What is the relationship between the efficiency and quality of nursing homes*
4. *Is the consumer quality index an acceptable measurement tool?*

2. Background.

Nursing homes in the Netherlands – Goals and Budgeting.

In order to fully understand how inputs have an effect on the eventual quality of care, the way in which a Dutch long-term care facility works must also be understood. The main question is then; what is the goal of a Dutch nursing home?

The goal that Dutch nursing homes communicate externally, is that they aim to create a situation in which the patient (named client), can continue to function as independently as possible for as long as possible in a safe environment by providing a fitting combination of care and housing. Thus, their ethical goal is to maintain a quality of life level that is as high as possible for as long as possible (Rijksoverheid, 2017). Besides providing each client with the necessary care, nursing homes' intention is to let the clients live a life as normal as possible. If the clients are not able to perform everyday actions themselves, nurses assist the clients with these actions, or teach them other ways to cope with everyday activities (Sonneburgh, 2016).

Because of the fact that achieving this general goal costs a lot of labour force, the quality of that labour (care), should be as high as possible.

Furthermore, besides a healthcare institution, nursing homes are also businesses. In order to provide care and housing to their clients each year, nursing home need to have a healthy business management strategy that is responsible for the nursing homes organisational structure and finances. One of the main rules such management has to deal with is that a Dutch nursing home cannot make a profit by law. Therefore the goal of a nursing home is by definition not to maximize profit. However, their budgets are established ex ante, together with the goal of production, in collaboration with local authorities (Eggink & Blank, 2001). This means that a nursing home has to maintain a certain efficiency level in order to prevent going over budget.

The goal should be to increase the efficiency without decreasing the quality of care. As has been said in the introduction, the prices that a nursing home can ask for their services, are determined by law. Furthermore, the patients are the indirect buyers of long-term care. Meaning

that the biggest part of the fee of a nursing home is reimbursed by the insurer. Therefore competing on the price is not relevant for a nursing home (Z.I.C., 2017).

The insurer pays the nursing home in most of the cases per actual ‘treated’ patient in the nursing home, this fee per patient is negotiated each year. However, there have also been pilots in some local government with population budgeting. In this case the local government is the client of a health care provider to which it assigns the care of a whole population given a certain budget. The health care provider has then the option to distribute this in their own way. The insurers that are appointed by the local government could for example choose to contract smaller homecare providers if this saves money (KPMG Plexus). However, in this thesis, the quality of care is investigated for inpatients in nursing homes only, and therefore only the finances at institutional level are relevant.

Thus, the biggest part of the financing of nursing homes in the Netherlands is derived from public money, which is distributed by the insurer. An example of an insurance that covers long term care in the Netherlands, is the “Wet Langdurige Zorg” (Overheid.nl, 2017), which translates to “Long-term Care Law”. However, in a full-time stay for a patient, the patient is expected to contribute a minor part of the total costs, this part can be seen as the contribution for housing, food and other non-care related issues. (Jaarverslagenzorg, 2017).

In this way a nursing home receives an indirect (via the insurer) and direct payment from each client. Furthermore, local governments also have to make a contribution to the nursing homes in their municipality. On top of that, nursing homes receive subsidy if they follow certain guidelines, and sometimes also get funded by local companies that want to contribute to the public as a form of charity.

Even though the nursing homes cannot make profits, this does not mean that there is no pressure. The people that are working in a nursing home will probably want to keep their job, to ensure this, there is the need for a nursing home to keep existing. And because of the fact that the only way in which nursing homes can compete is quality, every nursing home should aim to achieve a quality of care that is as high as possible, of course without overspending on their budget. Increasing quality, is therefore a tool, that should have as goal to attract more patients, which means more employment opportunities for the nurses (Hingstman et al, 2012). The patient could of course also base their choice on aspects such as the location of the nursing home, but this is not a factor that a nursing home can influence. Therefore the best option for a

long-term care home in influencing the choice of a potential patient, is by improving the quality of the nursing home (Zimmerman, 2003).

Furthermore, nursing homes in the Netherlands are not fully in charge in terms of choosing their patients (Eggink, & Blank, 2001). They should accept any patient that seeks help and is in need of long-term care, regardless of any disability or illness. Therefore they do not have the option to focus on patients that need a relatively low amount of care, which are patients that cost less and would therefore contribute to efficiency. In order to increase the quality of care, the available input has to be optimized. But what exactly are considered outputs and inputs?

Quality; Input or Output?

As has been concluded in the previous paragraph, increasing the quality of care should have the highest priority for a long-term care home. The aim is to see what the effect of quality of care is in the total process of providing long-term care. The production function would in principle be: $Y = f(\text{nurses, capital, etc.})$, with Y =outcome, and factors such as nurses and capital as income. However, we want to incorporate quality in our analysis, and it is very arguable whether quality of care is an output, or an input. And furthermore, it is also not clear how this quality should be measured. The most logical output for healthcare, is health itself. Ideally we want to measure how much health has been added, or how the quality of health has changed, but health is difficult to qualify or quantify. Therefore in other healthcare analyses, other more quantifiable outputs are used, such as number of days until recovery or number of deaths.

In curative care it is easier to incorporate quality as an input, because in the end the outcome of care will be the effect of the treatment, such as recovery from a broken leg, or reducing negative symptoms of a disease. On the one hand, one could say that quality is a part of all input variables. As all aspects of and around providing long-term care, such as nursing, treatment and safety, but also things like communication and condition of the housing can be of high or low quality (Zimmerman, 2003). In such a case a distinction would be made in the quantity of nursing care, which is the number of hours of care given, and the quality of these hours of given care. Nursing homes however do not deal with health problems that they directly have to fix, as the goal is to maintain quality of life as high as possible for as long as possible. Therefore

the eventual product that a long-term care facility produces is “care”, which is then the output (Laine et al, 2005).

Quality as an output might then be more logical, all the aspects of and around providing long-term care will in such a case be seen as inputs, which will together result in one outcome: adjusted quality of the given care (Zimmerman, 2003). Especially in the specific case of quality of care in nursing homes, the question remains how this quality of care should be measured (Sochalski, 2004).

In our hypothesis we assume that there are a lot of inputs, of which some have a more significant effect on the output than others. Examples of inputs are then, budget (f), number of nurses (n) and number of beds (b). One output that is certain is the amount of days of care given. Because of the fact that the position of quality is not yet defined, this research will perform explorative analyses to see what the relationship between the given days of care as output and quality is. Linear analyses will be performed with quality on both the input and the output side. Furthermore, a frontier analysis is used to see what incorporating quality in the output measure means for the estimated efficiency levels of the nursing homes. (Eggink & Blank, 2001)

2. Research Methods

Data

In order to study the determinants of long-term care institutions in the Netherlands, 349 long-term care homes in the Netherlands will be investigated Cross-Sectional in this thesis. Meaning that both the input and the output data of all the long-term care homes is collected simultaneously by “Zorginstituut Nederland” (Zorginzicht, 2017) and has been made publically available. The data that is collected represents the activities of the nursing homes in the year 2014.

Initial input & output data

The input data that has been collected by Zorginstituut Nederland is based on the annual reports. Each health care facility in the Netherlands is obliged to publish such an annual report on their achievements and goals in a year. Therefore, all nursing homes are indirectly also mandated to publish data accessible for everyone. This data is subdivided in several categories. Such as; Production & Personnel, Spending on Innovation, Structure of the Board, and Annual Budget. Each category contains quantitative and sometimes qualitative data on the relevant subjects. This dataset from Zorginstituut will be used mainly for input, however the output variable, ‘total days of care given in a year’ also originates from the annual reports. The Input and Output determinants that are used to create the variables used in this analysis can be seen in Table 1.

Quality data & CQ Score

On top of providing the direct quantitative data from the annual financial reports, Zorginstituut Nederland also provides standardized quantified information about the annual quality of the different nursing homes. This information is mainly based on the process of caregiving as is experienced by the patients. This will serve as the quality data in this study. The numbers that represent the quality of care are based on the Consumer-Quality Index. The Consumer-Quality Index is a tool that is developed by the Dutch Institute for Research on Healthcare (NIVEL,

2016), and represents the quality of care as has been experienced by the patients. A score of 0 is the lowest possible attainable experienced quality, and a score of 5 is the highest. These CQ scores are obtained via various interviews and surveys among the patients and representatives of the patients of these nursing homes. Even though the interviews and surveys are not entirely similar, they have to follow certain guidelines which allows the results to be comparable (Triemstra et al, 2010), the CQ score will be discussed in the next paragraph. The number of personnel will be expressed in number of FTE, which means fulltime-equivalent and is a unit to compare workload (**table 1**).

Table 1, Descriptive statistics variables.

Output	Mean	Std Dv	Min	Max
Total days of care given per year (in 1000s)	187,185	19,04	2.82	1084
CQ index score	3.38	0.14	2.95	3.77
Input				
Total Capital (in 1000's)	634.1	425.6	239.2	5094.5
Total Annual Budget (in 1000's)	4,547	584	348	53,050
Number of beds	563,31	58.47	24	3301
Number of FTE per year	171,38	79.9	1.4	1842.3
Total annual personnel costs (in 1000's)	4,319	5,605	255	40,942
Number of patients	145.917	223.43	12.78	2394
Expenditure on innovation	1,985	1.658	0,717	9,211

CQ Score

A large share of the analyses, results and conclusions that are presented in this research are based on the available quality data that is derived from the CQ-Index scores. The original reason why the CQ-index has been introduced is to give potential clients more information about all health care institutions in the Netherlands and to help health care providers in assessing the quality of their work. With this information, the patients experience more transparency and can therefore make a better nursing home choice. Moreover, analyzing this data can also be useful for healthcare institutions, as they have the possibility to improve on the aspects of the CQ-index in which they score low. Furthermore, it helps national health care policy organizations to monitor what the level quality of care is in the Netherlands. The CQ-Index questionnaires consist of questions about the characteristics of the patient, questions about what

kind, and how many care/treatments they received, or know they can potentially receive. The questions are designed to capture how much they value this care (Wieger et al, 2007).

The CQ Index is based on questionnaires for the residents of the nursing homes. But also on questionnaires for representatives of the residents, such as family. The questionnaires for residents are taken via a 1 on 1 interview with an independent interviewer and are afterwards collected and sent, by an independent institution to the ‘Netherlands institute for health services research’ (NIVEL). The NIVEL is the institution that analyzes the results and determine the CQ scores. The questionnaires for the representatives are filled in directly by the respondents. Not all residents and representatives have to fill in the questionnaire, a sample is chosen that is based on a sampling method that is provided by the NIVEL (see appendix B) (Wieger et al, 2007). In long-term care, the questions are always answered with the help of an interviewer, also because clients in long-term care are not always (mentally) able to fill in a questionnaire independently. The majority of the questions in a CQ Index try to measure the experiences of the patients by providing them with categorical answers.. Questions in a questionnaire are for example:

1. How often did the nurse spent sufficient amount of time and attention during the process of giving you the necessary care?

Never

Sometimes

Most of the times

Always

2. How satisfied are you with the help and care you receive while taking a bath

Not

A little

Sufficient

Perfectly satisfied.

More categories of the questionnaires can be seen in Appendix A.

An issue with The CQ-Score is that the questionnaires are not necessarily uniform. There are protocols and guidelines that the questionnaires have to meet, but because the questionnaires for long-term care homes are not identical, comparing them might not be flawless. (Zorginstituut, 2015). Furthermore, there are private companies that develop and sell questionnaires to the health care institutions. It is not unthinkable that companies like these aim to develop CQ-index questionnaires that benefit their customers, which are the health care institutions (Bos et al, 2015).

Data transformation

In order to use the data for the analysis, I perform the following transformations:

The biggest issue with the data is that it does not provide a precise indication of the number of hours spent by personnel on actual care. Nursing homes only provide the number of total personnel (in full time equivalents, FTE) at the end of the calendar year in their annual report. This number includes nurses, but also other personnel, such as managers. . I therefore assume that the share of the FTE of employees that are no nurses, such as for example financial employees or a janitor, are relatively underrepresented in a nursing home and can therefore be neglected

The input variable FTE has a second issue however, as the total number of FTE for care include, besides intramural care in the nursing home (ZZP), also FTE's for nurses that provide care at clients' homes (VPT), FTE's for extramural care and FTE's for time spent on activities with clients. This issue is also present for the input variables 'Capital' and 'Budget'. Luckily, the output variable 'days of care given' is subdivided into days care for ZZP, VPT and extramural. Therefore, I make a second assumption that the ratio of 'days care given' for VPT, ZZP and extramural care, is the same as the ratio of 'FTE', 'Capital' and 'Budget' for each of these types of care.

However, a third assumption had to be made, because while FTE for ZZP was expressed in days, the extramural care was expressed in hours, and the time spent on activities were

expressed in dayparts of 4 hours. Therefore the assumption was made that a extramural day of care consists of 16 hours of care, (because there are 8 hours of sleep). In table 2 the differences in means for both 24 and 16 hours of care per day can be seen. Because of the fact that the difference is quite small because of the small percentage of extramural care, the 16 hour assumption will most likely not influence the results dramatically.

Furthermore, the variable ‘number of beds’ has been rewritten to the “occupancy rate” by dividing the number of beds by the days of care ZZP given, this is because the number of beds fluctuates a lot between different nursing homes.

Table 2 : sensitivity analysis for hours in a day care	
Variable	Mean
Total days of care given per year (in 1000s) (16 hours)	187,185
Total days of care given per year (in 1000s) (24 hours)	190.90

Methods

The empirical analysis can be divided in two phases.

First, I perform an explorative analysis. I analyze whether there is a relationship between quality of care, as measured by the CQ score, and inputs per patient by using linear regression analyses. This gives a first indication about the correlation between the input/output variables and Quality. I also estimate a Cobb-Douglas production function. I use this function to estimate how output, measured as days of care delivered, depends on labor and capital inputs and how the efficiency of these inputs is affected by the quality of care.

The second phase is then to incorporate quality into the output data. I will estimate a data envelopment analysis with the output consisting of both the 'CQ Score' and 'total delivered days of care'. The goal is then to see what kind of effect the inputs have on the efficiency of this combined output. Furthermore, I want to know if quality affects the efficiency at all. Therefore a data envelopment analyses without quality included in the output will be performed.

Linear regressions

The first step is an explorative analysis of the relationship between quality of care and inputs per patient. I do this by estimating a standard linear regressions using input data as independent variables, and the Consumer Quality (CQ) index, as a dependent variable. The result of this analysis will give insights in the possible correlation of the inputs and the quality. The CQ Index variable is directly derived from the set and is a score between zero and five. The independent variables are '1: patient per day of care', '2: FTE per patient per day of care', '3: total personnel costs per FTE', '4: innovation cost per day of care', '5: capital per day care', '6: occupancy rate' and '7: number of patients'. In formula this will result in:

$$CQ_i = X_i\beta + \varepsilon_i$$

Where CQ_i = the average CQ score for nursing home i

X = A Vector of the 7 mentioned variables for nursing home i

The independent variables are in this case expressed per day of care, as there is quite some variation in the number of ‘total days of care’ between all the care homes. ‘Total personnel costs per FTE’ is chosen because of the fact that higher personnel costs per FTE could indicate that nurses are more experienced and/or that the nurses have had a higher level of education. I assume that these aspects are indicators for higher quality of the nurses.

The variable ‘number of patients’ can show whether or not nursing homes with a higher volume benefit from their economies of scale.

CQ Score as an input

In the second linear regression, the CQ Score is indicated as an independent variable. The dependent variable is in this case the actual production of the nursing homes; ‘The number of full days of ZZP care given’. The independent variables can be found in table 3. The variables are again all rewritten in such a way that they are relevant for the quantity of ZZP care only.

1.CQ_Score
2.intra_patient_perdaycare
3.innovationcost (percentage)
4.Capital_intracare (log)
5.Occupancy_rate
6.FTE_intracare (log)
7,Totperscost_perintraFTE(log)

In this regression I want to see the relationship between the input variables on a quantity outcome. And because of the fact that there are big differences between the sizes of for example production and budget between the long-term cares homes, the Cobb-Douglas production function will be used as function for this analysis. The Cobbs Douglas function tell if an increase in both capital and labor (number of FTE’s) would also increase the output. If the increase in both input variables and the output variable are all exactly the same this would mean that there are constant returns to scale (Cobb & Douglas, 1928). Because of the fact that I want to value the FTE’s as well, a proxy variable ‘personnel cost per FTE’ is included. Furthermore, ‘innovation cost’ is expressed as percentage from the total budget.

In formula this will result in:

$$\log(\text{The number of full days of ZZP care given}) = (O_x + C_x + P_x + I_x) + y\log(H) + a\log(L) + \beta\log(K) + \varepsilon$$

Where L = Number of FTE

K = Capital in euro's

H = Human capital: 'personnel cost per FTE'

O = 'Occupancy rate',

C = 'CQ Score',

P = 'patient per day of care'

I = 'innovation cost'

The values of O , C , P and I together form the Total Factor Productivity (A). Which is a constant for each nursing home that therefore has an extra effect on the combined effect of Labor and Capital on the production value. By including the Total Factor Productivity into the model I can see whether values of O , C , P and I differ between nursing homes.

The question this analysis can solve is whether or not extra financial or labour inputs will raise the amount care given, regardless of the quality of those days of care. Furthermore the CQ Score could provide information whether or not a higher Quality of care would go hand in hand with a decrease in quantity of care. This could indicate that a higher quantitative efficiency would be at cost of the quality.

Data Envelopment Analysis.

After the explorative analysis on the relationship between quality and the output/input variables, the next step is to see what quality as a part of the total output does for the nursing homes' efficiency scores. I want to know whether or not increasing the amount of inputs has an effect on the efficiency of the nursing homes. Furthermore I want to see what the role of quality is on the efficiency. The efficiency analysis is performed using the existing literature on efficiency that not focusses on average efficiency, but on the most efficient nursing homes, which are on the frontier. The specific analysis used in this thesis is a Data Envelopment Analysis (DEA). According to the displayed Cobbs-Douglas function, the total production is partly based on the combination of the inputs 'Labor' and 'Capital', the nursing home that has the most efficient combination of these inputs is on the frontier. We want to look at the highest efficiency because information about a frontier nursing home can potentially be important for other nursing homes.

Data Envelopment Analysis a linear and non-parametric programming technique. The most important reason why Data Envelopment analysis has been chosen, is because of the fact that the DEA method can be used relatively easy to determine efficiency with multiple inputs and outputs. Once again, the idea of DEA is that the nursing home with the most efficient combination is on the frontier. This could in theory mean that a frontier nursing home uses

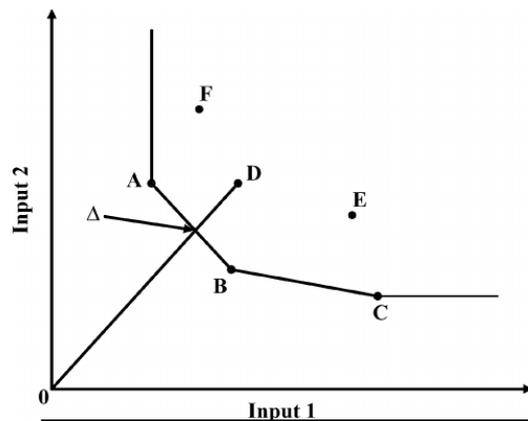


Figure 1: Frontier line in a data envelopment analysis.

one input 3 times as much as another input, but also that several inputs are used more equally (see figure 1). It is the combination that counts. The DEA could give insight into which combinations of inputs has the most beneficial effect on a combination of outcomes, in this case the combination of Quantity and Quality of care (Alfonso Pina & Martinez, 2015).

A DEA can be performed both Input- and Output-oriented. In an input oriented DEA the output is kept constant, because the objective is to see what possible combination of input is the most efficient. In an output oriented DEA the input is kept constant, as the objective is to see how much you can produce with the available resources (Read, 1998). In this Thesis I will make use of an ‘Output-oriented Data Envelopment Analysis’ because the intention is to maximize the output given the inputs that we have. The DEA automatically identifies the production frontier, where the nursing homes with a maximized weighted score of outputs given a constant weighted score of the inputs lie on. The structure of the weights is calculated based on means of mathematical programming in which Constant Returns to Scale are assumed by the researcher (Banker et al 1984). The nursing homes with the highest output score are then also given the value of 1, therefore the nursing homes in the frontier have a score of 1 and are technically efficient. The score of the nursing homes that are not on the frontier must be interpreted as the ratio of produced outputs compared to the frontier (Karne et al 2003). A similar method was used in a long-term care analysis in the Netherlands from 1994 (Koooreman, P. 1994).

The DEA will be performed using STATA, using a user written code that is written by Ji, Y and Lee, C. Thus, the DEA defines the efficiency score as a weighted sum of outputs relative to a weighted sum of inputs. Result of this is that the efficiency in the DEA calculates is relative, as all the nursing homes are compared to the nursing homes on the frontier.

The Output variables in the DEA are:

‘1. CQ score’

‘2. Number of full days of care given”. (Per 1000 days)

The chosen input variables in the DEA are

‘3.Total personnel costs’ (in euro’s)

‘4.Capital’ (in euro’s)

Which in formula results in:

$$\text{Relative Efficiency of nursing home N} = \frac{U_1Y_1 + U_2Y_2}{V_3X_3 + V_4X_4}$$

Where: U = Weight given to Output

Y = Amount of Output

V = Weight given to Input

X = Amount of input.

After this DEA, I will perform another DEA with only “Number of full days of care given”. The differences between these DEA’s can give information on the effect of the quality score on the efficiency compared to the weighted output’s efficiency.

3. Results

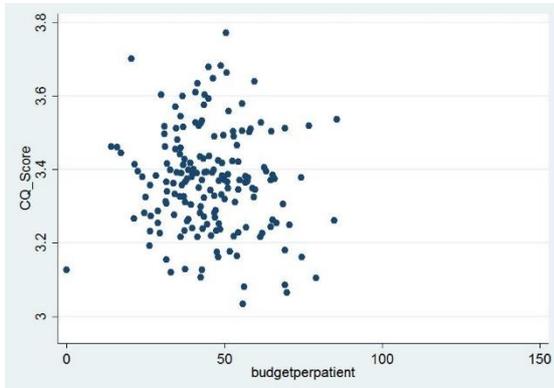


Figure 1: Relation Budget per patient and CQ Score

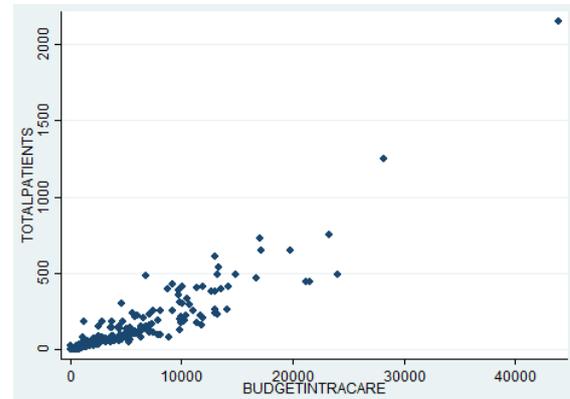


Figure 2: Relation 'Total Budget' and 'total patients'

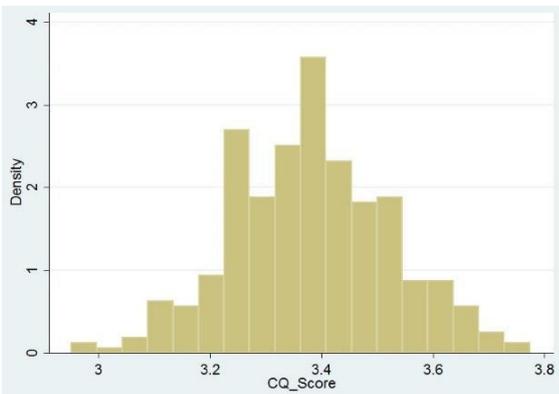


Figure 3: Distribution of the CQ Score

Linear regression with CQ Score as output.

The outcome of the linear regressions with CQ score as an output is summarized in table 4.

The null hypothesis for all the variables would be that a change in the variables would have no effect on the CQ Score.

Table 4. Summary of Linear regression analysis for long-term care homes' CQ Scores

variable name	B	SE(B)	T	Sig. (p)
Intra_patient_perdaycare	-0.020	0.024	-0.85	0.396
FTE_perpatient_perday	7.513	15.330	0.49	0.626
Totperscost_perFTEintra	-0.000	0.002	-0.07	0.947
Innovationcost_perdaycare	2.258	3.332	0.68	0.500
Intracapital_per_daycare	-0.043	0.013	-3.18	0.002
Occupancy_rate	-0.000	0.001	-0.12	0.907
Total_intra_patients	0.000	0.000	0.06	0.952
Constant	3.273	0.456	7.17	0.000
<i>Significant for p < 0.05</i>				

Taking a look at table 4, only the variable ‘capital per day of care’ has shown to be significant, and therefore we can reject the hypothesis that the amount of capital per day of care has no effect on the total days of care given. The effect of extra capital per day of care on the CQ score is negative. An explanation for this could possibly be that possessing more capital indicates that less of the funds have been used to hire extra nurses, or invest in another way that benefits the quality of care. The seven remaining variables are all insignificant and therefore we cannot reject the null hypothesis that there is no effect. Still, it is interesting to see what the signs of the insignificant variables can teach us.

The positive signs belong to the variables ‘FTE per patient per day of care’, ‘Innovation cost per day of care’ and ‘intra patients per day of care’ and are expected, even though they are not significant. The negative signs of ‘intra patients per day of care’ and ‘occupancy rate’ are also expected. As dealing with more patients, and more occupied beds could be at cost of the quality. The negative sign of personnel cost per FTE is a bit surprising, as it would be logical that higher paid employees are linked to higher quality, even though the signs are insignificant

Concluding, we can say that there do not seem to be a lot of significant correlations between the input variables, and the quality of care captured by CQ Score. However, it is questionable if this non-correlation is captured correctly by the data that is used. This will be discussed more in the next chapter.

Linear regression with total delivered days of care as an output and CQ score as an input

The outcome of the linear regressions with ‘total delivered days of care’ as an output is summarized in table 5.

Table 5. Summary of Linear regression analysis for long-term care homes’ total delivered days of care in a Cobb-Douglas production function.

variable name	B	SE(B)	T	Sig. (p)
<i>CQ_Score</i>	0.016	0.025	0.62	0.537
<i>intra_patient_perdaycare</i>	-0.053	0.005	-20.40	0.000
<i>Innovationcost (% of budget)</i>	-1.33	1.517	-0.87	0.385
<i>Occupancy_rate</i>	-0.000	0.000	-0.30	0.764
<i>LogFTE</i>	0.973	0.029	33.39	0.000
<i>Log_personellcost_perFTE</i>	0.470	0.081	5.76	0.000
<i>LogCapital</i>	-0.003	0.007	-0.51	0.611
<i>Constant</i>	39.274	16.66	2.36	0.020
<i>Significant for p < 0.05</i>				

The first thing that strikes is that there are three significant variables in the regression, ‘Intra_patient_perdaycare’, ‘Log_personellcost_perFTE’ and ‘logFTE’. In this case we reject the null hypothesis and can conclude that that these three variables have an effect on the number of delivered days of care. Because we transformed both the outcome variable, and some income variables to a logarithmic function, following the production function of Cobb-Douglas, we can tell more about the relation between these variables. According to the regression, 1% increase in Log FTE will increase the ‘total delivered days of care’ with 0.97%. Furthermore, 1% increase in the amount of personnel cost per FTE result in 0.47% more delivered days of care. It is expected that a higher number of FTE and a ‘higher personnel cost per FTE’ result in a higher quantity of production. These results show that higher quality and quantity of nurses benefits the total production.

The fact that more ‘patients per day of care given’ result in fewer days of care given in a nursing home is perhaps a little bit more remarkable. However, it in fact means that the efficiency in terms of quantity of a nursing home goes down when it has to deal with more patients that need care only a part of the day in a day. Thus, this implies that if patients need care only for a part of the day, the productivity of the nurses goes down. This might be due to the fact that there is loss of production because of the time needed to switch between patients, due to distance and for example small conversations (Hingstman et al, 2012).

Furthermore, it seems that the variable of ‘LogCapital’ does not have a large effect, as it is not significant. It is however notable that ‘occupancy rate’ and ‘innovation cost’ have a negative sign in this regression. Because a higher occupancy rate would mean more patients, which would mean more days of delivered care. On the other hand can it be said that bigger nursing homes might have more absolute days of care, but lower occupancy rates due to the fact that they have more available beds. And the expenses on innovation could perhaps also be used to influence quality. Finally, CQ Score as an input has a positive and insignificant sign regarding the total days of care.

Data Envelopment Analysis.

A summary of the top 10 best ranked nursing homes regarding total efficiency (consisting of Quality & Quantity) according to the results of the data envelopment analysis can be found in table 6A. In table 6B the top 10 ranked nursing homes regarding quantitative efficiency only can be found. Table 7 shows the 5 nursing homes with the lowest efficiency from both DEA’s.

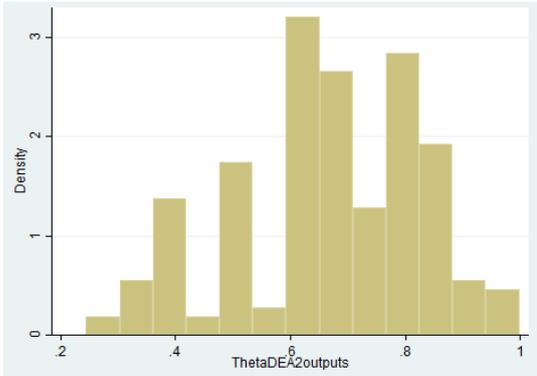


Figure 4: distribution Theta Scores combined output

Table 6A. Summary of Data envelopment analysis: Top 10 long-term care homes in the Netherlands with the highest efficiency in 2014. (Based on output consisting of Quality and Quantity).

Name	City	Theta score
Brentano Amstelveen	Amstelveen	1
Woon- en zorgcentrum Humanitas	Deventer	0.9988
Humanistische Stichting Zorggroep Reinalda	Haarlem	0.9614
Cedrah	Capelle aan den IJssel	0.9528
Archipel	Eindhoven	0.9427
Zorgstroom	Middelburg	0.9463
Zorggroep Charim	Veenendaal	0.9152
Groenhuysen	Roosendaal	0.9072
Argos Zorggroep	Schiedam	0.8995
Amaris Zorggroep	Laren	0.8815

Outputs : 'CQ Score' and 'total delivered days of care'
 Inputs : 'FTE', 'innovation costs', 'budget', 'capital', 'total personnel cost per FTE'

Table 6B. Summary of Data envelopment analysis : Top 10 long-term care homes in the Netherlands with the highest efficiency in 2014 (based on output consisting of only Quantity)

Name	City	Theta score
Humanistische Stichting Zorggroep Reinalda	Haarlem	1
Zorgstroom	Middelburg	0.9615
Brentano Amstelveen	Amstelveen	0.9543
Woon- en zorgcentrum Humanitas	Deventer	0.9473
Archipel	Eindhoven	0.9463
Cedrah	Capelle aan den IJssel	0.9149
Groenhuysen	Roosendaal	0.8819
Zorggroep Charim	Veenendaal	0.8749
Argos Zorggroep	Schiedam	0.8697
Ouderenzorg Wilgaerden	Hoorn	0.8656

Outputs : 'CQ Score' and 'total delivered days of care'
 Inputs : 'FTE', 'innovation costs', 'budget', 'capital', 'total personnel cost per FTE'

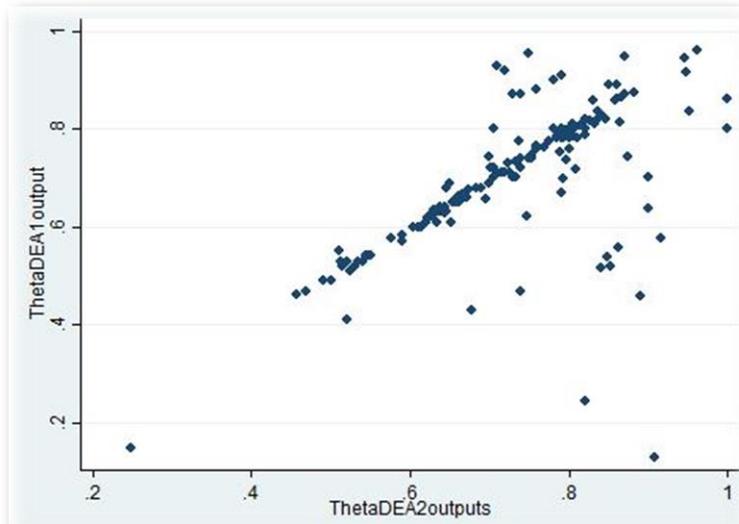


Figure 5: Relation between DEA with 1 output and DEA with 2 outputs.

Table 7. Summary of Data envelopment analysis : Bottom 10 long-term care homes in the Netherlands with the lowest efficiency in 2014

2 outputs		
Name	City	Theta score
Inovum	Loosdrecht	0.5772
Protestants Christelijk zorgcentrum De Riederborch	Ridderkerk	0.5215
Meandergroep Zuid-limburg	Heerlen	0.4690
Careyn	Schiedam	0.4683
Zorgsaam Zeeuws-Vlaanderen	Terneuzen	0.2490

In table 6A it can be seen that nursing home “*Brentano Amstelveen*” is on the frontier for total efficiency, because of the Theta score 1. If we would compare the most inefficient nursing home with the one on the frontier, we can conclude that the nursing home “*Zorgsaam Zeeuws-Vlaanderen*” produces 24,90% of the outcome in comparison to “*Brentano Amstelveen*” with the same amount of inputs. This comparison can be made with all the nursing homes, as the combination of weighted inputs is constant for all the nursing homes, only the value of the output differs. The theta scores, and therefore the ratio of production with the given inputs can be found in the tables.

Looking at the results of tables 6A and 6B, and the Scatterplot in figure 5, it is immediately noticeable that the names of the nursing homes are quite similar and the line in the scatterplot is quite linear. This indicates that the CQ Score did not affect the efficiency a lot, as the quantitative efficiency ranking is quite similar. Figure 5 also shows that the Theta Scores for

the DEA with one output are slightly lower on average than the values of the DEA with two outputs. An explanation for this is that having a higher CQ Score has no correlation with higher inputs, this has also been shown in the regression with CQ Score as dependent variable. Based on these results we cannot say that quality and efficiency are related to each other.

Thus, we have information about which nursing homes perform best and worse, it is furthermore interesting to see in what way these two groups of nursing homes distinguishes themselves. In table 8 some descriptive statistics of the nursing homes as a group are displayed. It is immediately noticeable that the top 10 nursing homes have higher values for all the seven variables. Therefore a logical assumption is that the top 10 nursing homes have more financial power, and therefore the opportunity to hire more FTE, and treat more patients. A logical explanation for the fact that this selection of nursing homes have both a higher efficiency score and a higher outcome value, could be that they benefit from economies of scale. This means that the assumption of constant returns of scale on which the DEA is based is violated. However, this is only data about the top and bottom 10 nursing homes.

Table 8. Descriptive statistics of top 10 nursing homes vs bottom 10 nursing homes. (combined output)

Variable name	Mean Top 10	Mean Bottom 10
<i>Capital (1000's)</i>	925.5	77.4
<i>Budget (1000's)</i>	5,670	1,707
<i>Days of delivered care</i>	246.6	95.2
<i>Innovations costs (1000's)</i>	6.94	1.44
<i>Nr patients</i>	54.6	14.7
<i>FTE</i>	211,9	66.2
<i>CQ Score</i>	3.15	3.09

Table 9A. Summary of Linear regression analysis on Theta Scores of DEA with 2 outputs.

variable name	B	SE(B)	T	Sig. (p)
<i>Capital_intracare</i>	0.000	0.000	1.31	0.197
<i>Innovationcost</i>	-0.011	0.167	-0.69	0.496
<i>Intra_patient_perdaycare</i>	-0.001	0.007	-0.09	0.925
<i>FTE_intracare</i>	0.000	0.000	1.44	0.157
<i>Totperscost_perdayintracare</i>	-0.002	0.000	-0.97	0.338
<i>Occupancy_rate</i>	-0.001	0.000	-1.89	0.064
<i>Constant</i>	1.286	0.235	5.47	0.000
<i>Significant for p < 0.05</i>				

Finally, we can take a look at what variables influence the efficiency. The effects of the variables on Total efficiency can be found in table 9A. In table 9A, there are no significant variables. Considering the signs however, nursing homes with higher amounts of FTE's, and

more capital, are most efficient. While the other variables have a negative effect on efficiency. Furthermore, because I assumed constant returns to scale for the DEA, the insignificant results in table 9A, mean that there is no significant relationship regarding constant returns to scale. However, in combination with the information about the top 10 and bottom 10, it could mean that in this case there are increasing returns to scale. As nursing homes with the biggest outputs have higher efficiency.

Both the DEA's teach us that quality and efficiency do not have a relationship with this data. They also show that there are indeed efficiency differences, in which nursing homes with high outputs perform best. Important is however that significance should ideally be based on the combination of quality and quantity nursing home care, but based on figure 5 it is more likely that the signs of these variables have more impact on the quantity of care component than on the quality of care component. Once again, the role of the CQ-Index might play a role.

4. Discussion & Conclusion

Discussion and limitations

The goal of this thesis was to assess which aspects determine the quality of care in nursing homes. The first sub-objective was to investigate the correlation between the inputs and the quality, the second question was to see how quality of care relates to efficiency.

The results of the regressions in this study show that the CQ Scores of the nursing homes in the Netherlands do not depend on the amount of input of a nursing home. With only a significant correlation of ‘capital per day of care’ and the ‘CQ Score’. Striking is that this correlation is negative. The explanation for this variable being negative could be that more capital on the bank could mean that less amount of money is reserved to invest in the quality of care. Furthermore, the Cobbs-Douglas regression with CQ Score as an input did also not show that there is a relationship between the CQ Score and the quantity of care. However, it did show that a possible higher quality of the nurses benefits the quantity of care, which is interesting. Moreover, based on these results, we can conclude that there is no significant relationship between the quantity of inputs and the quality of care. Which is a negative answer to the first sub-question of this research. The fact that there was so little variation between the CQ Scores tells us that there are no differences in quality of nursing homes captured by the CQ-index in this study.

The efficiency of care is another point of discussion, as the second and third sub-question aimed to estimate both the efficiency differences between nursing homes, and the relationship between quality of care and the efficiency of nursing homes. The DEA has shown us that there are indeed efficiency differences between nursing homes. However, these efficiency differences are for the biggest part attributable to the output of ‘delivered days of care’. As the CQ scores and ranking of the DEA with the quantifiable outcome are comparable to the results of the DEA with combined Outcome. So we can also conclude that the relation between efficiency and quality of care does is not proven in this research.

When the results of the nursing homes is reviewed further it is noticeable that the top 10 nursing homes have significantly higher values for the input variables than the nursing homes with

lowest efficiency. Therefore a logical assumption is that the higher efficiency scores of the top 10 are attributable to 'economies of scale' or 'increasing returns to scale' Thus, there are differences in efficiency, but these are once again not related to the quality output.

Finally, the effects of the variables on the Theta scores tell us no surprising things as well, quality has no significant effect on the quantity efficiency. The variables that have an effect on the both of the DEA's are the same, and therefore quality has once again no influence.

Altogether, this leads to an answer for the main research question, which was ; “” *What are the most important determinants of quality of care in long-term care homes?*” that is not very satisfying. The conclusion is that in this study the input variables do not have a significant effect on the quality score. However, as has been said before, the lack of effect is probably the result of the small variation of the CQ Scores. Therefore we cannot exclude that the input variables are important for the quality of care based on this research. Furthermore, there were some limitations to the data.

The original input data related to finances and labour are in principle valid. However, data on finance and labour were only available for the total production of the long term care facilities. Because of the fact that for this research only data for inpatients of long-term care were relevant, the assumptions as described in the methods section were necessary. Even though it seems likely that the ratios of the labour and financial variables are comparable to the data on delivered days of care, there is always a possibility that these ratios differ in reality.

The biggest concern however is the data of the CQ Score. Firstly, the way in which is data is collected raises some questions. The CQ Score is not based on hard figures, they are based on a questionnaire on which people have to answer question with mostly categorical options that result in a score between 1 and 5. Secondly, the fact that the CQ Scores from the 349 nursing homes range from 2.95 to 3.77, which is a range of approximately 0.8 on a 5.0 possible range, raises the question if there is no 'end of scale' bias. Meaning that people are often not likely to value something extremely high or extremely low. On top of that, a lowest CQ score of 2.95 does not endorse the information, complaints and messages spread by for example the media that state that the care in Dutch nursing homes is of such a low quality. This is an indication that the CQ score does not grasp the reality in an appropriate manner.

Thus, when we look at the validity of the CQ Score in this study, we can conclude that the validity is at least very doubtful. Mainly based on the fact that, regardless of the validity of the CQ score itself, there is so little variation in the CQ score that the effect of the variables on this score can also be undervalued.

Recommendations & Conclusion

In order to be able to perform valid research regarding quality of care in the Netherlands in the future, a new way of measuring the quality of care is essential. More adequate data on the input of care regarding ZZP care is most likely already available, however not publically. The numbers that are specifically attributable to for example amount of nurses must be known by the long-term care homes, and should therefore be made available for research.

A new measure for quality of care in nursing homes is already on its way, because the Dutch Ministry of Health has also concluded that “the CQ score gives insufficient insight into the quality of care”. As soon as new quality data is available, new chances are also available to analyse this data. This new research can then be used help Dutch nursing homes to increase their quality of care in the future (Zorgvisie, 2015).

Based on this thesis, a new measurement tool should in my opinion meet at least the following two criteria ; Being able to deliver CQ scores with higher overall variation, and being able to set a standard. I think that the ‘end of scale’ bias plays a negative role in the assessment of the CQ score. The fact that all nursing homes’ CQ scores have similar scores that lie on the middle of the scale makes these value less interesting. Because of the similar values we cannot distinguish nursing homes based on quality. More variation can tell us more about the good and the bad of nursing home quality in the Netherlands.

Furthermore, the actual CQ Score does not give a proper answer on the question; does a score of 3.0 mean that a nursing home has good quality? In other words, what is the standard or the lower limit that the value of the Quality of a nursing home should have. A solution could be to have for example only two options per question in a questionnaire; ‘Satisfied’ and ‘not satisfied’. This would lay more emphasis on the aspects of care that are neglected, and could also influence the variation of the CQ scores among the nursing homes.

In the in unlikely event that insignificance of the inputs in this analysis on the quality of care are not attributable to the CQ-Index, I would focus on other characteristics of the nursing

homes. It is a possibility that the differences of the experienced qualities of care are attributable to for example cultural and demographic characteristics.

The final conclusion of this research is once again that we cannot say that more input and a higher efficiency have an effect on the quality of care as there are no significant relationships between these variables. However, it is questionable if the data on which the results and conclusion were based on are valid. Both the input and quality data are subject of discussion. Therefore I would not recommend to directly invest in more nurses for the nursing homes. But instead wait for more information on what exactly is the cause of low experienced quality of care. When this issue is known, that is where we should focus on.

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APPENDIX:

A

Bijlage 6A: Overzicht van items in de ervaringenlijst voor **interviews met bewoners** van verpleeg- en verzorgingshuizen en de mate waarin de items tegemoetkomen aan gestelde criteria voor itemselectie (N=2386).

	Item non- respons: % missing	Scheefheid:		Belang: % 'niet belangrijk'	Schaalbaar- heid: factorlading*
		% meest positieve ervaring	Overlap: r (> 0,60)		
7. Heeft u voldoende informatie ontvangen over wat zorginstelling kan bieden?	10,6%	18,8%	0,72 (v8)	4,9%	0,81
8. Heeft u voldoende informatie gekregen over de gang van zaken	12,4%	15,6%	0,72 (v7) 0,64 (v9)	12,4%	0,83
9. Heeft u voldoende informatie gekregen over uw rechten?	14,7%	12,5%	0,64 (v8) 0,63 (v10)	11,1%	0,83
10. Heeft u voldoende informatie gekregen over wat er van u wordt verwacht?	15,0%	13,8%	0,63 (v9)	12,8%	0,81
11. Heeft u voldoende informatie gekregen over het beleid, bijv. over beslissingen over zorg rond het levenseinde?	15,9%	11,4%		19,9%	0,69
12. Heeft u voldoende informatie gekregen over de cliëntenraad?	11,9%	14,5%		27,3%	0,60
13. Zijn er met u afspraken gemaakt over de zorg die u krijgt van het verpleeg-/verzorgingshuis?	7,8%	56% (ja, mond./ schrift.)		25,4%	0,41 (los item)
14. Komt het verpleeg-/verzorgingshuis de afspraken over uw verzorging en behandeling goed na?	38,9%	47,5%		3,0%	0,42
15. Staat het verpleeg-/verzorgingshuis voldoende open voor uw inbreng, wensen en vragen?	30,0%	46,0%		3,3%	0,48
16. Hoe vaak beslist u mee over de verzorging of behandeling die u krijgt?	11,1%	20,5%	0,66 (v17)	15,3%	0,88
17. Hoe vaak beslist u mee over de tijdstippen en dagen waarop u verzorging/behandeling krijgt?	11,8%	17,1%	0,66 (v16)	22,2%	0,87
18. Heeft u in de afgelopen 12 maanden een evaluatiegesprek gehad?	23,3%	22,5% (ja)		23,1%	0,49 (los item)
19. Is de zorg n.a.v. evaluatiegesprek bijgesteld?	82,8%	49,5%		16,2%	n.v.t.
20. Weet u bij wie u met vragen, problemen en eventuele klachten terecht kunt in het verpleeg-/verzorgingshuis	3,7%	57,5%		6,9%	0,36
21. Reageert de leiding (directie) adequaat (vlot, correct) op uw vragen/suggesties/klachten?	36,0%	41,2%		6,6%	0,38
22. Wordt u goed op de hoogte gehouden van de activiteiten in huis?	2,8%	74,4%		14,8%	0,47
23. Heeft u een vaste contactpersoon als aanspreekpunt in het huis?	4,6%	45,0%		14,9%	0,76 (los item)

B: Steekproeftrekking CQ Index:

Bijlage 1A: Richtlijn steekproeftrekking voor interviews met bewoners (niet psychogeriatrisch)

Bewonersraadpleging Verpleeg- en Verzorgingshuizen 2006

Per huis of locatie (resultaatverantwoordelijke eenheid) moeten 35 personen geïnterviewd worden, en hiervoor moeten 2 x 35 personen uit het bewonersbestand worden geselecteerd om een *selectielijst* en een *reservelijst* samen te stellen. U dient hiertoe onderstaande richtlijnen te doorlopen. Documenteer daarbij zorgvuldig elke stap door het bijbehorende *registratieformulier steekproeftrekking* in te vullen.

Stap 1: vaststellen eenheid (locatie)

Indien het verpleeg-/verzorgingshuis meerdere locaties of organisatorische eenheden heeft die deelnemen aan de pilot, splits dan het gehele bestand van bewoners van 'somatische' afdelingen (niet BOPZ) op per locatie/eenheid. Definieer en omschrijf deze eenheid nauwkeurig op het *registratieformulier* (bij punt 1), en registreer de unieke code van de locatie (zie de ActiZ-lijst). Geef op het *registratieformulier* ook aan hoeveel bewoners deze eenheid heeft. Doorloop de stappen vervolgens afzonderlijk voor iedere locatie/eenheid.

Stap 2: actualiteit

Ga na of het bestand actueel is; controleer het bestand op overledenen.

Stap 3: exclusie

Verwijder alle personen die op basis van exclusiecriteria (psychogeriatrische patiënten, pg-indicatie, ernstige medische/psychiatrische beperkingen, enz.) niet voor de interviews benaderd kunnen worden. De afdelingshoofden, contactverzorgenden of EVV-ers kunnen een eerste inschatting maken van welke personen in principe in aanmerking komen om te worden geïnterviewd. Noteer bij punt 2 op het *registratieformulier* het aantal personen dat wordt uitgesloten van deelname en de redenen hiervoor.

Stap 4: kenmerken bewoners

Noteer op het *registratieformulier* (bij 3) het aantal bewoners dat na deze 3 stappen is overgebleven, hun gemiddelde leeftijd en het aantal mannen en vrouwen in deze groep.

Stap 5: steekproeftrekking

Zet de bewoners op volgorde van cliëntnummer (van laag naar hoog). Deel het aantal bewoners door 35. De uitkomst van deze berekening (afgerond naar beneden op een heel getal) noemen we X. Vervolgens selecteert u iedere X^e bewoner (bijvoorbeeld iedere 10^e bewoner als uw bestand bestaat uit 350 bewoners, of iedere 5^e bewoner als u 175 bewoners heeft).

Stap 6: selectielijst en reservelijst

Stap 1 tot en met 5 hebben geleid tot een *selectielijst* van circa 35 bewoners (steekproefbestand 1).

Noteer op het *registratieformulier* (bij 4) het aantal bewoners op de selectielijst, hun gemiddelde leeftijd en hun geslacht. Vervolgens moet voor elke selectielijst een even lange *reservelijst* worden gemaakt (steekproefbestand 2), voor de benadering van 'extra' interviewkandidaten indien sprake is van uitval of afwezigheid van kandidaten op de selectielijst. Herhaal hiervoor stap 5 en ga nu bij de berekening van X uit van het aantal overgebleven bewoners na de eerste steekproef. Houd deze reservelijst achter de hand,