ECONOMIC ANALYSIS OF SCHOOL-BASED ORAL HEALTH PROGRAMME AT PRIMARY SHOOL IN THE NORTH OF VIET NAM

NGUYEN THI BACH YEN

A thesis Submitted in Partial Fulfillment of the Requirements

for the Degree of Master of Science

Department of Economics

Graduate School

Chulalongkorn University

1995

ISBN 974-632-301-6

Thesis title

ECONOMIC ANALYSIS OF SCHOOL-BASED ORAL

HEALTH PROGRAMME AT PRIMARY SCHOOL IN

THE NORTH OF VIETNAM

Graduate

: Nguyen Thi Bach Yen

Department

: Economics

Advisor

: Assistant Professor Dr. Siripen Supakankunti

Co-advisor

: Dr. Chev Kidson

Accepted by the Graduate School, Chulalongkorn University in Partial Fulfillment of the Requirements for a Degree of Master of Science in Health Economics.

Sand Throngsuran

Dean of Graduate School

(Assoc. Prof. Dr. Santi Thoongsuwan)

Thesis Committee:

Wonunya Paturane Chairman

(Assoc. Prof. Waranya Patarasuk)

Willen Adviso

(Asst. Prof. Dr. Siripen Supakankunti)

.... Co-advisor

(Dr. Chev Kidson)

V Tayd Member

(MD.Dr. Viroj Tangcharoensathien)

C760715: MAJOR HEALTH ECONOMICS
KEY WORD: ECONOMIC ANALYSIS/ COST-EFFECTIVENESS/ SCHOOL-BASED ORAL HEALTH

NGUYEN THI BACH YEN: ECONOMIC ANALYSIS OF SCHOOL-BASED ORAL HEALTH PROGRAMME AT PRIMARY SCHOOL IN THE NORTH OF VIETNAM. THESIS ADVISOR: ASST. PROF. SIRIPEN SUPAKANKUNTI, Ph.D. 98pp. ISBN 974-632-301-6

This is a retrospective study based on secondary data collected during 1990-1994. The objectives of the study were to analyze the costs to provider in implementing the School-based Oral Health Programme at primary schools in the North of Vietnam with the aim to suggest the most costeffective programme.

School-based Oral Health Programme has been applied in the North of Vietnam since 1985 but the coverage is still low. For evaluating this programme, dental status is measured by DMFT indices which indicate the number of decayed, missing and filled teeth per person. The effectiveness was measured by the difference of DMFT index between intervention and non-intervention group. In this study, an attempt has been made to analyze the costs to provider in implementing the Programme and its impacts on the dental caries.

The analysis consists of three stages:

- 1. The DMFT indices of the two groups of school children, one implementing the Programme and the other not implementing the Programme, were tested and it was found that DMFT indices of the two groups of school children were significantly different. The DMFT index of the intervention group was lower than that of the non-intervention group.
- 2. By analysing the costs of the programme in the urban, rural area, and two areas, it was shown that by using current price and constant price for calculation, the total cost and the average cost for running the programme are not too high and decreased year by year. The Programme is necessary to the children in both areas.

Under this Programme the children can avoid not only dental disease but also related diseases. Besides, they can save money from dental treatment and save the time loss from their schooling and their parent's work. From the cost analysis of the programme, cost-effectiveness was examined to evaluate the effectiveness of the programme. The cost-effectiveness ratio decreased every year suggesting that the programme was effective. But this ratio in the rural area was higher than the urban area. When the Programme was applied, the effectiveness of the programme in the rural area was lower than that in the urban area.

3. Sensitivity analysis was carried out to assess the impact of input activities on the outcome of the programme, given assumption regarding the change of each component of recurrent cost, which includes consumable cost, personal cost, retraining cost for the teachers, repair and maintenance cost and supervision cost. It was found that among these costs, consumale cost played the most important part. This cost had more effect on the cost-effectiveness ratio when compared with the others.

Sensitivity analysis of the change in effectiveness showed that the change of cost-effectiveness ratio was higher than the change in the effectiveness.

The study provides information about the costs of the programme and its impacts but how to expand this programme to a nationwide level, it requires a further study.

| ภาควิชา Economics | ลายมือชื่อนิสิต 📈 |
|---------------------------|---|
| สาขาวิชา Health Economics | ลายมือชื่ออาจารย์ที่ปรึกษา พ่าวุ่นท |
| ปีการศึกษา 1994 | ลายมือชื่ออาจารย์ที่ปรึกษาร่วม ใในใใจใก |

ACKNOWLEDGMENTS

I sincerely express my gratitude to my advisor, Assistant Professor Dr. Siripen Supakankunti, who generously gave me expert advice and encouragement in writing this thesis from the beginning to the end of the study. Her help and support were invaluable to me

I am grateful to Dr. Chev Kidson, my thesis co-advisor, for his advising, suggesting and editing my thesis. Under his instruction, I have been able to complete the research

I specially thank Dr. Viroj Tangcharoensathien for his advice and commends during the course particularly in my thesis.

I am also thankful to Associate Professor Waranya Patarasuk for her warmly advice and encouragement.

My special thanks go to TDR Organization for offering me the scholarship to attend this course in Thailand.

I am also grateful to Assistant Professor Dr. Kaemthong Indaratna, Programme Director and all the staffs of the Center for Health Economics for their kindness and advice

My largest debt is to my parents, my husband and my children, all my friends who generously provided me support and encouragement.

May, 1995 In Bangkok, Thailand

CONTENTS

| | | page |
|-----------------|------------------------------------|------|
| Abstract | | . ii |
| Acknowlegme | nts | |
| Contents | | . iv |
| List of tables | | . V |
| List of figures | | . vi |
| Chapter 1: II | ntroduction | 1 |
| 1.1 | Background and problems | 1 |
| 1.2 | Reseach question | 6 |
| 1.3 | Objectives | 6 |
| 1.4 | Scope of the study | 7 |
| 1.5 | Hypothesis of the study | 7 |
| 16 | Limitation of study | 7 |
| 1.7 | Benefit of study | 7 |
| Chapter 2 L | iterature review | 8 |
| 2.1 | Water fluoridation | 10 |
| 2.2 | Improvement of dental hygiene | 12 |
| 2.3 | Changing dietary habit | 12 |
| 2.4 | The pit and fissure sealant | 14 |
| 2.5 | Visiting the dentist regulaly | 14 |
| 2.6 | School-based Oral Health Programme | 14 |
| Chapter3: R | Research methodology | 16 |
| 3.1 | Definition of DMFT and DMFS index | 16 |
| 3_2 | Conceptual framework | 17 |
| 3.3 | Method of design | 25 |
| 3 4 | Method of sampling | 26 |
| 3.5 | Method of data collection | 27 |

| 3.6 3.7 | 8 | 28 29 |
|-------------------|--|----------------|
| Chapter 4: A | nalysis of data collection | 36 |
| 4.1 4.2 4.3 | Statistical technique to test the impact of the programme To analyse the costs to provider of the school-based oral health programme establishment and operation Sensitivity analysis to analyze the impacts of input factors on the DMFT index of the programme | 36 44 75 |
| Chapter 5: D | iscussion | 78 |
| 5.1 5.2 5.3 | The impacts of school-based oral health programme on dental caries Analyzing the cost of programme establishment and operation Sensitivity analysis of the impacts of input factors on the programme | 78 83 93 |
| Chapter 6: C | onclusion and recomendation | 94 |
| 6.1 6.2 | Conclusions | 94 95 |
| Reference | | 0.7 |

LIST OF TABLES

| Table 1.1 | DMFT Index in Industrialized Countries Reported at Two Different Points of Time |
|----------------|--|
| Table 1.2 | The Increasing Trend of DMFT Index in Developing Countries |
| Table 2.1 | The Global Goal of WHO for Dental Caries at the End of this |
| 1 4010 2.1 | Century |
| Table 4.1 | Population of Two Groups of School Children, One Implementing the |
| | Programme, and the Other not Implementing the Programme |
| Table 4.2 | The Dat Required for Testing Variance of Two Groups of Children, |
| | One Implementing the Programme and the Other not Implementing |
| | the Programme in Urban Area |
| Table 4.3 | The Result of F-Distribution Test |
| Table 4.4 | The Dat Required for Testing Variance of Two Groups of Children, |
| | One Implementing the Programme and the Other not Implementing |
| | the Programme in Rural Area |
| Table 4.5 | The Result of F-Distribution Test |
| Table 4.6 | The Dat Required for Testing Variance of Two Groups of Children, |
| | One Implementing the Programme and the Other not Implementing |
| | the Programme in both Urban and Rural Areas |
| Table 4.7 | The Results of F-Distribution Test |
| Table 4.8 | The Dat Required for Testing the Difference of DMFT Index of Two |
| | Groups of Children, One Implementing the Programme and the |
| | Other not Implementing the Programme in the Urban Area |
| Table 4.9 | The Results of t-test of the DMFT Index between Two Groups of |
| T. 1.1. | Children in Urban Area |
| Table 4.10 | The Dat Required for Testing the Difference of DMFT Index of Two |
| | Groups of Children, One Implementing the Programme and the |
| T 11 4 11 | Other not Implementing the Programme in the Rural Area |
| Table 4.11 | The Results of t-test of the DMFT Index between Two Groups of |
| T-1-1- 4-10 | Children in Rural Area |
| Table 4.12 | The Dat Required for Testing the Difference of DMFT Index of Two |
| | Groups of Children, One Implementing the Programme and the |
| | Other not Implementing the Programme in both Urban and Rural |
| T-bl- 4 12 | Areas |
| Table 4.13 | The Results of t-test of the DMFT Index between Two Groups of |
| Table 4.14 | Cost System for Establishing and Russian the Reagrance |
| Table 4.14 | Cost System for Establishing and Running the Programme |
| Table 4.13 | The Way for Calculating the Costs of Consumable Population of Two Groups of School Children in both Areas |
| Table 4.17 | Cost of Equipment for Examination |
| Table 4.17 | Cost of Equipment for Examination Cost of Equipment for Treatment |
| T ADIO T, IO | Cost of Equipment for Freutinent |

| Table 4.19 | Cost of Equipment to Serve for Dental Service |
|------------|--|
| Table 4.20 | The Price of Consumable during 1990-1994 |
| Table 4.21 | Number of Unit Used during 1990-1994 Period in Dong da School |
| Table 4.22 | Number of Unit Used during 1990-1994 Period in Nghia Hung School |
| Table 4.23 | Number of Unit Used during 1990-1994 Period in both Dong Da School and Nghia Hung School |
| Table 4.24 | Monthly Salary of Dental Nurse during 1990-1994 |
| Table 4.25 | DMFT Index of Two Groups of School Children in Dong Da School |
| Table 4.26 | DMFT Index of Two Groups of School Children in Nghia Hung School |
| Table 4.27 | DMFT Index of Two Groups of School Children in both Nghia Hung School and Dong Da School |
| Table 4.28 | Consumable Cost of the Programme in Urban Area during 1990-1994 |
| Table 4.29 | Consumable Cost of the Programme in Rural Area during 1990-1994 |
| Table 4.30 | Consumable Cost of the Programme in both Urban and Rural Areas during 1990-1994 |
| Table 4.31 | The Cost of Dental Nurse during 1990-1994 in Urban Area and Rural Area |
| Table 4.32 | The Cost of Dental Nurse during 1990-1994 in both Urban and Rural Areas |
| Table 4.33 | Annual Retraining Cost for the Teacher and Average Retraining Cost for the Teacher per Child |
| Table 4.34 | Annual Supervision Costs |
| Table 4.35 | Annual Recurrent Costs of the Programme in the Urban Area during 1990-1994 at Current Price |
| Table 4.36 | Annual Recurrent Costs of the Programme in the Urban Area during 1990-1994 at Constant Price. |
| Table 4.37 | Annual Recurrent Costs of the Programme in the Rural Area during 1990-1994 at Current Price |
| Table 4.38 | Annual Recurrent Costs of the Programme in the Rural Area during 1990-1994 at Constant Price. |
| Table 4.39 | Annual Recurrent Costs of the Programme in the Urban and Rural Area during 1990-1994 at Current Price |
| Table 4.40 | Annual Recurrent Costs of the Programme in the Urban and Rural Area during 1990-1994 at Constant Price |
| Table 4 41 | Annual Total Costs of the Programme during 1990-1994 |
| Table 4.42 | Annual Average Costs of the Programme during 1990-1994 |
| Table 4.43 | Annual Marginal Costs of the Programme during 1990-1994 |
| Table 4.44 | Annual Table Cost-effectiveness of the Programme during 1990-1994 |

| Table 4.45 | Total Costs, Average Cost, and Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When ACC was changed | 75 |
|------------|--|----|
| Table 4,46 | Total Costs, Average Cost, and Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When ANC was changed | 76 |
| Table 4.47 | Total Costs, Average Cost, and Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When ARC was changed | 76 |
| Table 4,48 | Total Costs, Average Cost, and Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When AME was changed | 76 |
| Table 4 49 | Total Costs, Average Cost, and Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When ASC was changed | 73 |
| Table 4.50 | Average Cost, Cost-effectiveness of the Programme Establishment and Operation during 1990-1994 When Effectiveness Decreased 20% | 73 |
| Table 5.1 | The Prevalence of Students Suffering from Dental Caries of the Two Groups in the Urban Area | 79 |
| Table 5.2 | The Prevalence of Students Suffering from Dental Caries of the Two Groups in the Rural Area | 8(|
| Table 5.3 | The Prevalence of Students Suffering from Dental Caries of the Two Groups in the Urban Area | 8 |

LIST OF FIGURE

| Figure 2.1 | The Combination of Factor that Cause Dental Caries | 9 |
|-------------|---|----|
| Figure 3.1 | Conceptual Framework of the Study | 18 |
| Figure 3.2 | Cost Component and their Classification | 22 |
| Figure 3.3 | Predict and Value Outcome of the Group of School Children with | 23 |
| | Programme | |
| Figure 3.4 | Value Outcome of the Group of School Children not Implementing | |
| | the Progrmme | 24 |
| Figure 3.5 | The Impact of Input Activities on the Outcome of the Programme | 25 |
| Figure 3.6 | The General Shape of Cost Curve | 33 |
| Figure 5.1 | The Prevalence of Student Suffering from Dental Caries of Two | |
| | Group in the Urban Area | 79 |
| Figure 5.2 | The Prevalence of Student Suffering from Dental Caries of Two | |
| _ | Group in the RuralArea | 80 |
| Figure 5.3 | The Prevalence of Student Suffering from Dental Caries of Two | |
| _ | Group in the Urban and Rural Area | 81 |
| Figure 5.4 | Components of Recurrent Costs in 1990-1991 | 83 |
| Figure 5.5 | Components of Recurrent Costs at Current Price in 1991-1992 | 84 |
| Figure 5.6 | Components of Recurrent Costs at Constant Price in 1991-1992 | 84 |
| Figure 5.7 | Components of Recurrent Costs at Current Price in 1992-1993 | 85 |
| Figure 5.8 | Components of Recurrent Costs at Constant Price in 1992-1993 | 85 |
| Figure 5_9 | Components of Recurrent Costs at Current Price in 1993-1994 | 86 |
| Figure 5.10 | Components of Recurrent Costs Constant Price in 1993-1994 | 86 |
| Figure 5.11 | The Difference of Recurrent Costs by Using Two Schemes for | |
| C | Calculation | 87 |
| Figure 5.12 | Total Cost of the Programme by Using Two Schemes for Calculation | 88 |
| Figure 5.13 | Average Cost of the Programme of Urban and Rural Areas | 89 |
| Figure 5.14 | Cost-effectiveness ratio of the Programme in Urban Area | 90 |
| Figure 5.15 | Cost-effectiveness ratio of the Programme in Rural Area | 90 |
| Figure 5.16 | Cost-effectiveness ratio of the Programme in Urban and Rural Area | 91 |
| Figure 5.17 | Cost-effectiveness ratio of the Programme in Urban Area and Rurl | |
| _ | Area | 92 |