Model Development of A Medical Birth Regstry System in Korea: A Strategy for Improvement of Family Health Statistics

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Preface

The revision of the Family Registration Law provides birth certification system in Korea, whose primary aim is to improve the accuracy of birth allocation by birth date. However, even in this revision, the birth certificate form does not include the medical and health information necessary for risk assessment of the newborn and the mother. The medical and health information at birth is very important in planning and eveluating health activities, and can be collected through birth certification system only.

This is the report on the study project to assess the feasibility of establishing a medical birth registry system by revising the current birth certificate form to collect the medical and health information on newborn at birth, and to develop a scheme to utilize the collected information for planning and evaluating the national and local health activities. The information collected through the revised birth certificate form can be very useful for planning and evaluating national and local health activities. It is also expected that the revised form of birth certificate and the new birth registry system would improve the quality of health statistics.

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The opinions expressed in this report represent the author's and do not reflect the official views of the Korea Institute for Health and Social Affairs.

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Chapter I
INTRODUCTION

1. Statements of Problem

Births and deaths are the main factors affecting the changes in population size and structure. The vital statistics are used as the basic data not only in projecting future population size and structure, but also in planning, evaluating and administering health activities.

The basic data for births and deaths come from (1) national censuses of population, (2) the vital statistics registration system, and (3) national sample surveys. The birth-related vital statistics have been collected through the data from birth registration, population census, and social survey on fertility and family health. Because of the limitations inherennt in the survey, however, the birth statistics useful for planning and evaluating the national and local health activities has not usually been included in such surveys.[1)]

Census: The population census has been taken regularly every 5 years in Korea. The typical scope of the census is the size, distribution, and characteristics of the population at a specified time. The population census provides (1) data on the age composition of the population from which the level of recent fertility can be inferred, (2) statistics on children by

family status of their parents, and (3) population bases for calculating various types of fertility rates.[2] The direct data on births provided by census include retrospective reports on the number of children previously born to women and on whether the woman had a child in a previous stated period. However it is often too expensive to tabulate data from special fertility questions in the census.

The government have annually published the vital statistics, which are based on the data of registration system of vital events. The articles 25 and 49 of the Family Registration Law, and the articles 2 and 4 of Vital Registration Act provide the birth registration system in Korea. However, the vital statistics provided by the registration system suffer from a number of deficiencies. The types of deficiencies include the failure to register all births, the considerable delays in registration, and the inaccuracy of birth date in registration.

Vital Registration: In Korea, vital events such as births, deaths, marriages and divorces are in principle reported and registered by the chief of household through three separate systems, namely (1) civil registration to the supreme court, (2) notification of vital events to the Statistics Office, and (3) residence registration to the Ministry of Home Affairs.

So far, the Ministry of Health and Social Affairs has not been directly involved in the administration of vital statistics reporting and registration; however, they do encourage the

parents to make a voluntary reporting of their pregnancy and live birth when they wish to obtain care during pregnancy based on the recently revised MCH law in 1989. Thus, health and medical professionals have never been directly responsible for the reporting and registration of births attended by them.

Birth Certification: The hospital personnel have helped the clients by issuing the birth certificate when the clients request the birth attendants (physicians or midwives) for the birth registration. The content of the birth certificate form is defined by the medical care law.

Recently, the Supreme Court has revised the Family Registration Law, so that all birth registrations require a birth certificate signed by attending physicians, midwives, or others at delivery, starting from January 1st, 1991. The revision of the law provides birth certification system in Korea, whose primary aim is to improve the accuracy of birth allocation by birth date. The birth certificate includes the information on father and mother of the newborn, on the newborn, and pregnancy and fertility history of the mother. However, even in this revision, the certificate form does not include the medical and health information necessary for risk assessment of the newborn and the mother.[3)4)]

While the medical and health information at birth is very important in planning and eveluating health activities, it cannot be collected through population censuses, vital registrations, or

social surveys. This information comes from birth certification system only.

2. Objectives of the Study

The primary objectives of this study are: (1) to assess the feasibility of establishing a medical birth registry system by revising the current birth certificate form to collect the medical and health information on newborn at birth, and (2) to develop a scheme for utilizing the collected information for planning and evaluating the national and local level health activities. The specific aims of this study are: (1) to develop a new birth certificate form, which includes some items on medical and health information of the newborn and mother; (2) to develop a system for collecting and analyzing the birth-related information through the health and medical service delivery system; and (3) to suggest a scheme for utilizing the medical and health information provided by birth certification system in planning, evaluating, and administering national and local health activities.

3. Methods

Several scientific methods are employed to achieve the objectives of the study. Those are field observation, review of literature, and implementation of the study project.

1) Field Observations

Observation method was conducted to review and examine the current birth registration and birth certification system. The research staff visited the institutions related with birth registration and birth certification, and examined following questions:

① In what ways does the birth registration system work?
② Is there any problem or issue in the current birth registration system?
③ In what ways is the birth certificate prepared and filed?
④ Is the information reported in birth certificate correct and accurate?
⑤ In what ways is the birth certificate form utilized? and
⑥ Who prepares and files birth certificate for the newborn delivered at home?

The field observation was conducted in six communities, which was selected ramdomly by the research staff (Table 1). The research staff visited birth-related facilities - hospitals and clinics, health centers, mother-child health centers, and midwife posts, and administrative institutions related to vital registration.

2) Review of Literature

In order to revise the current birth certificate form including medical and health information of the newborn and mother for use in planning and evaluating health activities, the research

<Table 1> Communities and Institutions Selected for Observation

Communities	Institutions
Chungju Shi, Chungbuk	Municipal Office: Departments of Family Registration and Statistics 2 town-block offices Chungju Health Center 2 hospital and birth-related clinics 1 midwife's office
Chungwon Kun, Chungbuk	County Office: Departments of Family Registration and Statistics 2 local community offices Chungwon Health Center Chungwon Mother Child Health Center
Iri Shi, Chunbuk	Municipal Office: Departments of Family Registration and Statistics 2 town-block offices Iri Health Center 2 hospital and birth-related clinics 1 midwife's office
Icksan Kun, Chunbuk	County Office: Departments of Family Registration and Statistics 2 local community offices 2 hospital and birth-related clinics Icksan Health Center
Chunchon Shi, Kangwon	Municipal Office: Departments of Family Registration and Statistics 2 town-block offices Chunchon Health Center 2 hospital and birth-related clinics 1 midwife's office
Chunsung Kun, Kangwon	County Office: Departments of Family Registration and Statistics 2 local community offices Chunsung Health Center Chunsung Mother Child Health Center

staff reviewed the literature on birth registration and certification systems in other countries, especially in the United States of America, the United Kingdom, and Japan. The research staff examined the following questions in literature review:

① In what ways does the birth registration system work in those countries?

② In what ways does the birth certification system work in those countries?

③ What kind of informations are contained in the standard birth certificate form of those countries?

④ In what ways are the data collected through birth certification system utilized?

3) Implementation of Study Project

A study project was conducted for assessing the feasibility of using the revised birth certificate form, and the usefulness of the data collected through birth certification system. The purpose of the study project was to know, (1) whether or not the revised birth certificate can be prepared and filed correctly? If not, what are the problems in preparing and filing the form? (2) how the information provided by the revised birth certificate can be utilized in planning and evaluating health-related activities?

The target institutions and the period of the study project are

as follows.

① Target community and institutions:

a. All birth-related medical facilities in Chungju Shi and Chungwon Kun, Chungbuk Province

ⓐ Minjung Hospital-Kunkook University Hospital

ⓑ Dr. Lee Chongsu's Obstetrics and Gynecology Clinic

ⓒ Dr. Lee's Obstetrics and Gynecology Clinic

ⓓ Chungju Medical Center

ⓔ Chungju Seongshim Clinic

ⓕ Hongil Midwife's Office

ⓖ Dr. Byun's Obstetrics and Gynecology Clinic

ⓗ Chungwon County Mother Child Health Center

b. 5 birth-related hospitals in Seoul and Taegu

ⓐ Yonsei University Hospital

ⓑ Hanyang University Hospital

ⓒ National Medical Center

ⓓ Cha Hospital

ⓔ National Kyungbuk University Hospital

② Period of the model study:

June 1, 1991 - November 30, 1991 (6 months)

4. Significance of the Study

The theoretical implication of this study is very limited. But this study has much implication for policies aimed to improve

health activities in Korea. The information collected through the revised birth certificate form can be very useful for planning and evaluating national and local health activities. It is also expected that the revised form of birth certificate and the new birth registry system would improve the quality of health statistics.

Notes:

1) Shin, Yoon-Jae, 1987: 27-29
2) Shryock et al., 1976: 462-463
3) Economic Planning Board, 1988: 12
4) The Article 49 of the Family Registration Law states that "a birth certificate signed by attending physicians, midwives, or others at delivery should be attached to the birth reporting form."

Chpater II
IMPLEMENTATION OF STUDY PROJECT

1. Design of a Revised Birth Certificate Form for the Project

1) Need for a Revised Birth Certificate

A. Importance of Birth Certification

When a birth occurs, the person responsible for registering the birth shoud report the event of birth with the birth certificate within three weeks of the birth (Article 49 of the Family Registration Law). The birth certificate filed with birth registration is very important, because:

① A birth certificate is a permanent legal record.

A birth registration with birth certificate is the statement of facts concerning an individual. They are permanent legal records, proving the age and parentage of an individual. They are needed for entrance to school; voter registration; obtaining a driver's license, marriage license, or social security benefits; and many other purposes. In Korea, the statement in the birth report and birth certificate is a reference document to family registration and resident registration, which is needed for the purposes described above.

② The data provided by birth registration and birth certification are basic resources of vital statistics.

The vital statistics based on birth registration system are the basic sources in measuring fertility, mortality, and population growth, which provide the projection of future population.

③ The data provided by birth registration and birth certification can be of use in planning, evaluating and admistering health policies.

In Korea the birth certificate is of use in proving the age and parentage of an individual only. In other countries, especially in the developed countries, however the health and medical information collected through birth certificate is of use in developing vital statistics, and in planning, evaluating and administering the national and local health activities.

B. Necessity of Revising Birth Certificate Form[1)]

Beginning January 1991, the Korean government introduced the birth certification system by the revised Law of Family Registration, which states that each birth registration require a mandatory birth certificate completed by attending physicians, midwives, or others at delivery. The current certificate form, however, includes the limited information such as identification of parents, and place and time of the birth. and is of no use in developing more accurate vital statistics, or in planning health

policies.

While The current birth certificate form contains an open question for each item of 'physical status of the newborn' and of 'health status of the newborn', the item is usually filled up by the certifier, and completed simply as 'normal' or 'good'. Therefore, it has been advocated to revise the current birth certificate form to include more detailed informations about risk factors of pregnancy, delivery complications, and health status of newborn and contents of cares received during pregnancy and delivery.

It is very necessary and timely for revising the current birth certificate form in terms of the followings as:

① In Korea more than 90 per cents of the newborns were delivered inside an institution in 1991. It implies that the health and medical information of the newborns and the mothers can be provided by the birth certifiers who attended more than 90 per cents of the newborns in Korea.

② The birth certificate is completed by the physician attending at the delivery, and whose statement, therefore, can be more accurate than the surveys.

③ The information provided by the birth certification system can be useful for identifying risk factors which influence maternal and neonatal outcomes, and for estimating the incidence and prevalence of the high risk pregnancy, and

④ The health and medical information provided by the revised

birth certificate can be of use in assessing fetal distress, low Apgar score, other neonatal conditions which may possibly affect the development of long term neurologic sequels.

2) Guidelines for Revising Birth Certificate Form

The project staff set up some guidelines in developing the draft of new birth certificate. The guidelines included:

① The form should contain the items useful for collecting health statistics and implementing family health program;

② The items in the form can be completed based on the information from the mother's and child's medical history and chart;

③ The form should be simplified;

④ The form should be the revised one from the current certificate, rather than new one; and

⑤ The items 8 and 9 in the current form, which are open-ended questions, should be standardized.

3) Process of Revising the Birth Certificate Form

A. Organizing the 1st Consulting Committee Meeting

The 1st consulting committee meeting was held on April 4, 1991, to review the study plan and provide some guidelines for developing a draft of the new birth certificate form. The members of the committee were:

Ehn Hyun Choe, Ph.D.: Vice President, KIHASA
Sook Bang, M.D. & Dr.P.H.: Senior Consultant, KIHASA
Kyung Seo, M.D. & M.P.H.: Assistant Professor, Dept. of Obstetrics and Gynecology, Yonsei University
Chung Keun Kim, Ph.D.: Professor, School of Public Health, Seoul National University
Chin Taek Chung: The Korea Medical Association
Chung Gil Han: Director, Dept. of Family Health, Ministry of Health and Social Affairs (MOHSA)
Han Seok Woo: Sub-chief, MCH Division, MOHSA
Ki Jun Park: Director, Dept. of Medical Administration, MOHSA
Sung Il Kim: Director of Health Statistics Division, MOHSA

B. Drafting the new birth certificate form

Review of the current birth certificate form: Before developing the draft of new birth certificate form, the study staff reviewed the current form. The current form consisted of:

I. Child's Parent
1-1. Father: Name, age, occupation, origin place, date of birth, and residence registration number
1-2. Mother: Name, age, occupation, origin place, date of birth, and residence registration number
2. Mother's Residence
3. Place of Birth (if not hospital, city or county, village or township, street and number are specified)
3-1 (1) home, (2) hospital, (3) clinic, (4) MCH Center, (5) midwife's post, or (6) other
3-2 Facility Name (if checked (2) through (5) in the above)
II. Child (newborn)
4. Date and Time of Birth:
5. Clinical Estimate of Gestation
6-1. Name and Sex of Child
6-2. Plurality
6-3. Order of Birth(in case of plurality)
6-4. Still-births or not for each birth, including identification of sex

7. Pregnancy History
   Numbers of Live Births, Now Living, and Now Dead
   Number of Previous Still-Births
8. Physical Status of the Newborn
9. Health Status of Newborn at Delivery

III. Certifier
   Date signed
   Address of the certifier
   Name of institution
   License number (doctor or midwife)
   Signature of certifier

Developing the draft of new birth certificate form: Following the guidelines, the study staff developed the darft of new birth certificate form. The draft consisted of 10 items, and the items 1 through 9 on the draft included the same items as those on the current birth certificate form. The item 10 was added on the draft of new birth certificate form, which would be useful for collecting information on health condition of mother and the newborn. The item 10 consisted of: (1) sociodemographic characteristics of mother, (2) numbers of mother's pregnancy and birth, (3) prenatal care, (4) information related to this pregnancy and delivary, and (5) health status of the new-born.

C. Organizing the 2nd consulting committee meeting

The 2nd consulting committee meeting was held on April 23, 1991 to review the first draft of new birth certificate form. The attended members were:

Ehn Hyun Choe, Ph.D.: Vice President, KIHASA

Sook Bang, M.D. & Dr.P.H.: Senior Consultant, KIHASA
Kyung Seo, M.D. & M.P.H.: Assistant Professor, Dept. of Obstetrics and Gynecology, Yonsei University
Jae Eok Lee, M.D.: Professor, Dept. of Obstetrics and Gynecology, Hanyang University
Joo Youn Cho, M.D.: Head, Dept. of Obstetrics and Gynecology, Cha Hospital

D. First Revising the Draft

Based on the results of the 2nd consulting committee meeting, the study staff revised the draft. The medical and health information in the item 10 of the new form was formatted into checkboxes. And the order of list in each checkbox item were reviewed and reordered according to frequency occurred in Korea.

E. Pretesting the Revised Draft

Pretest of the revised draft of new birth certificate form had been implemented for seven days, between May 1 and May 7, 1991. Three medical institutions - Yonsei University Hospital, Hanyang University Hospital, and Cha Hospital participated in the pretest. The check list of pretest contained item sequence, wording, format, and others.

F. Second Revising the Draft

Based on the results of the pretest, the study staff revised the draft of birth certificate form. The 2nd revision of the form included the items of:

Items 1 through 9: same as the current one
Item 10: medical and health information about mother and child
10-1. Educational attainment of the mother
10-2. Transfers of mother prior to delivery
10-3. Marital status of mother
10-4. Number of spontaneous and induced terminations, and date of the last one
10-5. Date of last live birth
10-6. Month of pregnancy prenatal care began and total number of prenatal visits
10-7. Clinical estimate of gestation
10-8. Obstetric procedures
10-9. Medical risk factors for this pregnancy
10-10. Method of delivery
10-11. Complications of labor and/or delivery
10-12. Birth weight
10-13. 1 & 5 minute Apgar scores
10-14. Abnormal conditions of the newborn
10-15. Congenital anomalies of child

G. Printing the Revised Birth Certificate for the Project

The final version of the draft of new birth certificate form was printed for use in the study project. The Appendix A is a sample of the revised birth certificate form in Korean, and the Appendix B is the same in English.

2. The Revised Birth Certificate

1) Three Copies of the Revised Form

The project staff decided the revised birth certificate form can be composed of three copies. The first copy (Copy A) was the same as the current certificate, and contained item 1 through 9 only. This copy was designed to be issued to parents

of the newborn and be attached to birth report form in reporting a birth. The second copy (Copy B) contained the duplicated items 1 through 9 of the first copy and new item 10. This copy was designed to be filed in reporting institutions. The third copy (Copy C) was the same as the second copy including health and medical information. This was designed to be collected by the study staff.

2) Reasons for Selecting the New Items for Health and Medical Significance[3)]

The health and medical significance of the items contained in the revised birth certificate form is as follows:

① The Age of Mother: The age of the mother is one of the most important factors in the study of chi;dbearing. Studies have shown a relationship between the health of the child and age of the mother. For example, teenage women and women over 40 have a higher percentage of low-birth-weight and premature infants than women of other ages. This item is also useful for genealogical research.

② Marital Status of Mother: The information provided by this item is used for monitor the substantial differences in health and fertility between married and unmarried women. It enables the study of health problems encountered during and after pregnancies of unmarried women. This information allows researchers to measure medical risk factors of out-of-wedlock

children and their mothers. These children tend to have lower birth weight and higher infant mortality, and they may be born to mothers with less prenatal care. Because of these differences, unmarried women and theis babies are more likely to require additional health services.

③ Residence, Education and Occupation of Mother: Statistics on births are tabulated by place of residence of the mother. This makes it possible to compute birth rates based on the population residing in the area. Data on births by place of residence of the mother are used to prepare population estimates and projections. These data are used in planning for and evaluating community services and facilities, including maternal and child health programs, schools etc.

Education and occupation are correlated with fertility and birth outcome, and is used as an indicator of socioeconomic status. It is used to measure the effect of education and socioeconomic status on health, childbearing, and infant mortality.

④ Medical Risk Factors for This Pregnancy: This information allows for the identification of specific maternal conditions that are often predictive of poor maternal and infant outcome. It can be used for planning intervention and prevention strategies.

⑤ Prenatal Care: This information is used to determine the relationship of prenatal care to the health of the child at birth. Women receiving delayed care or no care are of considerable

interest to public health officials because inadequate care may be harmful to both the mother and fetus. The information on the month of pregnancy prenatal care began and number of prenatal visits can be used with length of gestination to compute the Kessner Index, a quantitative measure of the adequacy of prenatal care.

⑥ Obstetric Procedures: Information on obstetric procedures is used to measure the advanced medical technology during pregnancy and labor and to investigate the relationship of these procedires to type of delivery and pregnancy outcome.

⑦ Mother Transferred Prior to Delivery: This information is used to study transfer patterns and determine whether timely identification and movement of high-risk patients is occurring.

⑧ Method of Delivery: This information is used to relate method of delivery with birth outcome, to monitor changing trends in obstetric practice, and to determine which groups of women are most likely to have cesarean delivery. The method of delivery is relevant to the health of mothers, especially if it is by cesarean section. Information from this item can be used to monitor delivery trends across the nation.

⑨ Complications of Labor and/or Delivery: This information is used to identify pregnancy complications during labor and delivery and their relationship to method of delivery and birth outcome.

⑩ Birth Weight: This is the single most important

characteristic associated with infant mortality. It is also related to prenatal care, socioeconomic status, marital status, and other factors surrounding the birth. Consequently, it is used with other information to plan for and evaluate the effectiveness of health care.

①① Apgar Score: The Apgar score is regarded as a reliable summary measure for evaluating the physical condition of the infant at birth.

①② Abnormal Conditions of the Newborn: Information on abnormal conditions of the newborn helps measure the extent infants experience medical problems and can be used to plan for their health care needs. This item also provides a source of information on abnormal outcome in addition to congenital anomaly or infant death. These data allow researchers to estimate the number of high-risk infants who may benefit from special medical services.

①③ Congenital Anomalies of Child: Information on congenital anomalies is used to identify health problems that require medical care and monitor the incidence of the stated conditions. It is also used to study unusual clusters of selected anomalies, to track trends among different segments of the population, and to relate the prevalence of anomalies to other characteristics of the mother, infant, and the environment.

3) Hospitals' and Physicians' Handbook on the Revised Birth

Certificate

The study staff developed a handbook on completing the revised birth certificate. The manual was designed to provide instructions for completing and filing records of birth during the period of the study project.

The handbook translated into English is attached as Appendix C, and contains following:

a. Introduction
   1) Summary of the study
   2) Importance of birth certification system
   3) Structure of the new birth certificate form
   4) Purpose of the manual
b. General instructions for completing new birth certificate
   1) General instructions
   2) Completing the new birth certificate

3. Procedures of Completing and Filing the Revised Birth Certificates

When a birth occurs inside the target institutions, the institution personnel should complete three copies of the revised birth certificate within three days of the birth. The institution personnel should:

- collect and record the information about the parents and the medical data required on the birth certificate. The medical information should be obtained from the obstetric and

pediatric record.

- prepare a correct certificate, making certain that every item in certificate is completed.
- make the physician attending at the delivery review and sign the certificate.
- issue Copy A of the birth certificate to the parents of the newborn, who are responsible for reporting the birth to the registar office.
- maintain Copy B for institution's reference.
- send Copy C to Health Center of the community.

The birth certificates completed by hospital or clinic personnel are collected by the personnel of the Health Center in the community. The Health Center personnel should:

- collect Copy C of birth certificates prepared by the institution personnel.
- verify completeness and accuracy of the certificate.
- query incomplete or inconsistent certificates.
- if any errors are found, ask institution personnel to correct and complete the birth certificate again.
- send the certificates to KIHASA.

The study staff of KIHASA collects the birth certificates through the health center in the community. The study staff should:

- collect birth certificates.
- verify completeness and accuracy of the certificate.
- query incomplete or inconsistent certificates.
- compile health-related statistics.
- prepare to conduct health and social research studies.
- maintain a continuing technichal assistance to improve the quality and usefulness of vital statistics.

4. Organization of the Study Project

The study staff, consulting committee, community health center, and birth-related facilities in the target area are the key agencies of the model study. The organization of the model study is summurized in <Figure 1>, and the main duties of the agencies are as follows:

① Study Staff: The study staff is responsible in planning, implementing, and administering the model study. It also analyzes the data collected from the model study, and makes some policy implication based on the findings of the model study. The study staff is responsible for:

a. Developing the revised birth certificate,
b. Developing the system collecting birth certificate,
c. Developing physicians' handbook on birth certification,
d. Maintain a continuing technical assistance to complete birth

certificate,

e. Selecting target communities and institutions for model study,

f. Collecting birth certificates,

g. Analyzing the data provided by birth certificates, and

h. Developing a scheme for utilizing the data from certificates.

② Consulting Committee: The consulting committee consists of seven members. They are medical doctors and university professors of obstetric and preventive medicine, and government officials of family health and health statistics. They are consulting on:

a. Development of the revised birth certificate,

b. Pretest of the revised birth certificate,

c. Evaluation of the model study, and

d. Utilization of birth-related data.

③ Health Center: It is suggested that one health center staff member is given the overall responsibility for:

a. Collecting birth certificates from the target agencies,

b. Verifying completeness and accuracy of birth certificate, and

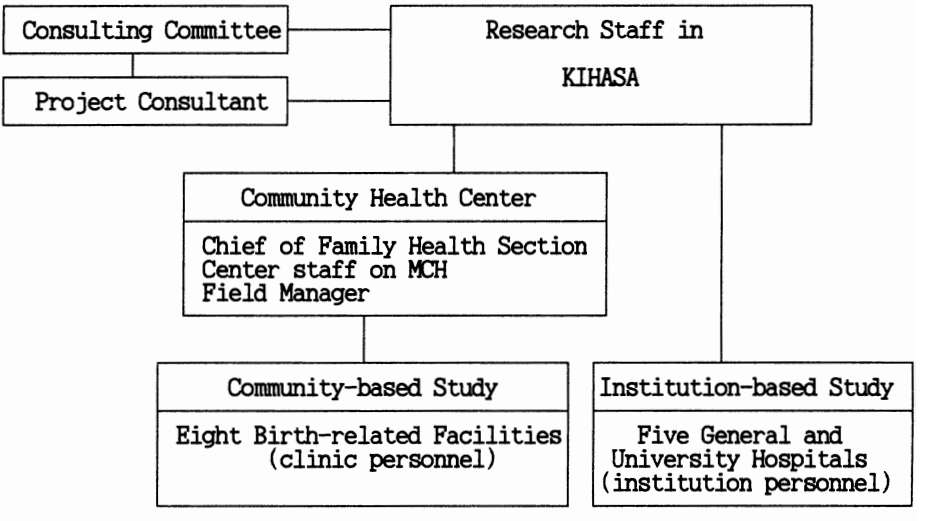
c. Querying incomplete or inconsistent certificates.

④ Birth-related Agencies: When a birth occurs inside the institution, the institution authority prepares and complete a birth certificate. The institution personnel is responsible for:

a. Preparing and completing the correct birth certificate, and

b. Correcting incomplete and inconsistent certificates.

<Figure 1> Organization of the Study Project



5. Study Design of Field Implementation

1) Period and Purpose of the Study Project

A six-months study project, from the first day of June to the end day of November, 1991, was planned to assess the feasibility of using the revised birth certificate form, and the usefulness of the data collected through birth certification system. The purpose of the study project is to know that: ① Whether or not the revised birth certificate can be completed and filed correctly? If not, what are the problems in completing and filing

the certificate? and ② How the information provided by the revised birth certificate can be utilized in planning and evaluating health-related activities?

2) Target Communities and Institutions of the Study Project

The model study was planned to be implemented in two different settings. One is institution-based; and the other is community-based. An institution-based study was simply to examine the possibility of recording the various items of the revised form which are related to medical and health information of the mother and newborn at delivery. For this purpose, the project named purposively the five public and private university or general hospitals in urban area where the problem cases are much more likely visiting or referred than the hospitals in rural area. The community-based study was to cover all the birth-related institutions in a geographically defined rural area for examining the feasibility of use of the revised form.

A. Selection of Target Communities

The study staff prepared some criteria in selecting target study area for the project. They are: (1) the area where annual live births are about 2,000; (2) the area where the in- and out-migrants are few; (3) the area where government officials' cooperation to the project is expected; and (4) the area where

the good relationships are assumed between medical doctors and government officials in health center. Considering these criteria, the study staff visited three communities, and finally selected Chungju Shi and Chungwon Kun as the study area of the project. Some characteristics of the three communities, of which the study area was selected, are summarized in <Table-2>.

<Table-2> Births and Birth-related Facilities of Communities

Community	Population	Births	Birth-related Facilities				
			Univ. Hospital	General Hospital	Clinic	Midwife Post	MCH
Iri Shi	214,002	2,675	1	-	9	-	-
Icksan Kun	115,294	1,552	-	-	-	-	1
Chuchon Shi	179,307	2,057	2	2	6	1	-
Chunsung Kun	49,395	581	-	-	-	-	1
Chungju Shi	125,146	1,124	-	2	5	1	-
Chungwon Kun	69,936	1,078	-	-	-	-	1

Sources: Chunbuk Province, 1990: 59
Chungbuk Province, 1990: 52
Kangwon Province, 1990: 55

B. Selection of Target Institutions of the Model Study

Community-based study: Chungju Shi and Chungwon Kun, Chungbuk Province was selected as the target area of the community-based model study. In the study area, 8 medical and

health facilities were related with delivery of birth. Those are:

ⓐ Minjung Hospital-Kunkook University Hospital
ⓑ Dr. Lee Chongsu's Obstetrics and Gynecology Clinic
ⓒ Dr. Lee's Obstetrics and Gynecology Clinic
ⓓ Chungju Medical Center
ⓔ Chungju Seongshim Clinic
ⓕ Hongil Midwife's Office
ⓖ Dr. Byun's Obstetrics and Gynecology Clinic
ⓗ Chungwon Mother Child Health Center

Institution-based study: Of birth-related hospitals in Seoul and Taegu, five university and general hospitals were selected institution-based study,. Those were:

ⓐ Yonsei University Hospital
ⓑ Hanyang University Hospital
ⓒ National Medical Center
ⓓ Cha Hospital
ⓔ National Kyungbuk University Hospital

6. Training of Physicians and Hospital Personnel on Completing the Revised Birth Certificate

Before implementing the study project, the study staff trained the personnel relating to new birth registry system in the model study. The training program was designed to provide instructions for completing and filing new birth certificate during implementation of the model study. The training program for the personnel in the community-based study area was implemented in Chungju City Health Center, May 28 and May 29, 1991. The participants in the training program were:

Hospital and clinic personnel of 8 birth-related facilities in Chungju Shi and Chungwon Kun

Director, Chungju Shi Health Center
Chief, Family Health Division, Chungju Health Center
MCH Technician, Chungju Health Center
Chief, Family Health Division, chungwon Kun Health Center
3 Midwives, MCH Center, Chungwon Health Center

The training program for the personnel in the institution-based study was implemented in May 30 and 31, 1991, and the participants in the training program were physicians in obstetrics and gynecology department, and nurses in labor and delivery room of five hospitals

7. Field Supervision

When a birth occurs inside the target institutions, the institution personnel completed three copies of the revised birth certificate within three days of the birth. The institution personnel issued Copy A of the birth certificate to the parents of the newborn and maintained Copy B for institution's reference. The birth certificates completed by hospital or clinic personnel were collected by the personnel of the Health Center in the community. The Health Center personnel collected Copy C of the birth certificates, and verified completeness and accuracy of the certificate. If any errors are found in a certificate, the personnel of the health center asked institution personnel to correct and complete it again.

The study staff of KIHASA visited the target community at

least once a month, and collected the birth certificates collected and verified by the health center personnel. During their stay in the community, the study staff assigned the field worker's responsibility, monitored progress of the model study, coped with field problems, and handled inquiries from the field.

Notes:

1) partially cited from Seo(1992)
2) Kim et al. 1990: 113-114
3) partially cited from U.S. Department of Health and Human Services (1987)

Chapter Ⅲ
FINDINGS OF THE STUDY PROJECT

1. Actual Recording Practice to Complete Birth Certificate

Medical institutions have different systems of preparing and completing birth certificate. At the stage of planning the study project, it was designed that the target institutions should complete three copies of the revised birth certificate, and issue Copy A, instead of the current birth certificate form, to the parents of the newborn. However, all of the target institutions in Seoul and Taegu completed two types of birth certificates, the current form and the revised form, and issued the current form, not Copy A of the revised birth certificate, to the parents of the newborn.

The current form of birth certificate was completed by medical doctors in all of the target hospitals in Seoul and Tague, except one hospital where1) adminstrative personnel prepared and completed the birth certificate. In the other hospitals the obstetrical physician who were in charge of prenatal care (in case of 'hospital 2'), or the attending physician (in case of 'hospital 1' and 'hospital 5') completed the birth certificate.

However, during the project period the revised birth

certificates for the study project were prepared and completed by the attending physician in the delevery rooms in most target hospitals, execpt 'hospital 4'. In 'hospital 4' an attending nurse in the delivery room ceompleted the revised birth certificate with help of the nurses, if needed, in the baby room. Since the information required on the birth certificate could be obtained from the medical record of the delivery room only, the items on the general characteristics of the parents of the newborn were often left incompleted. The project staff queried incomplete or inconsistent certificates, and asked each respective hospital that those birth certificates be corrected or completed again. In correcting and completing the birth certificate, hospital personnel collected the information required on the birth certificate based on the data in hospital charts, medical records of infant and mother, and the physicain's own record.

In the target institutions in Chungju and Chungwon area, the attending physician (in case of 'institution 2'), the attending nurce (in case of 'institution 1,' 'institution 4,' and 'institution 6'), the attending midwife (in case of 'institution 7' and 'institution 8'), or admisniatrative personnel (in case of 'institution 3') prepared and completed the revised birth certificate. But the physician made certain that every item in the birth certificate was complete and correct, and signed the birth certificate, no matter who completed it.

2. Actual Procedures of Collecting of the Completed Birth Certificates

1) Institution-based Study in Seoul and Taegu

To test the feasibility of recording the new form at the hospital setting, each participating institution was assigned to complete the revised birth certificate form for the child born after June 1, 1991. When a delivery resulted in a live birth, the revised form was completed. And each participating institute stopped completing the new form for the study project at the point when the institution completed 200 birth certificates. KIHASA's staff collected the birth certificates completed by institution personnel, and checked whether every item in the form was completed. The research staff also inspected each record for accuracy of information. Research staff queried imcomplete or inconsistent certificates, and sent them back to the respective institution personnel. The institution personnel corrected and completed the incompleted or inconsistent certificates. The corrected certificates were collected by the research staff.

The revised birth certificate collected from the institution-based study project were as followings:

2) Community-based Study in Chungju and Chungwon Area

Each participating institution in Chungju Shi(city) and

<Table-3> Collected Birth Certificates from the Institution-based Study

Institution[1]	Period[2]	Number of Birth Certificates Collected	Incompleted[3]	Completed
Hospital 1	6.1 - 8.17	224	29	195(87.1)[4]
Hospital 2	6.1 - 8.12	195	9	186(95.4)
Hospital 3	6.1 - 6.13	209	42	167(79.9)
Hospital 4	6.1 - 8.28	156	49	107(68.6)
Hospital 5	6.1 - 8.26	200	30	170(85.0)
Total		984	159	824(83.8)

Remarks: 1) To assure confidentiality of information, the title of facility is not specified.
2) The period refers to the birth days of children whose birth certificates were collected.
3) This is the number of imcomplete or inconsistent birth certificates even after correction.
4) The number in parenthesis is the percentage of the completed birth certificates of those collected.

Chungwon Kun(county) area was requested to use and complete the revised birth certificate for all the live births delivered at the participating institutions between June 1 and November 30, 1991. The institution personnel such as medical doctor, nurse or administrative staff collected and recorded the information about the parents and the newborn required on the birth certificate. The medical information was obtained from the obstetric record. The institution personnel completed birth certificate within three days of the birth. Every two weeks, a field manager, who was a public health nurse of the health center, collected the birth certificates completed by institution

personnel, and checked that every item in the form was completed. Field manager inspected each record for accuracy of information. Field manager queried and sent those imcomplete or inconsistent certificates back to the institution personnel. The institution personnel corrected and completed the incompleted and inconsistent certificates. The corrected certificates were collected again by the field manager. Every month the KIHASA's research staff stayed three or four days in Chungju and Chungwon area, to meet the field manager and institution personnel of the study. The research staff collected the certificates filed by the field manager. The research staff inspected each record for completeness and accuracy of information on the certificates. During their stay in the study area, the research staff worked together with the field manager in making queries on the certificate entries. The research staff also provided advice and assistance to field manager and institution personnel, when necessary.

Data collected from the institution-based model study in Chungju and Chungwon area is summarized in <Table 4>.

3. Coverage of Live Births Reported

Of 1,292 birth certificate collcted during the project period

<Table-4> Collected Birth Certificates from the Community-based Study

Insti-[1] tution	Birth Certificates: Collected on June	July	Aug.	Sept.	Oct.	Nov.	Total	In-completed[2]	Completed
1	27	31	65	60	66	42	291	14	277(95.2)[3]
2	34	28	45	36	43	67	253	29	224(88.5)
3	39	38	44	51	39	34	245	19	226(92.2)
4	22	24	47	17	33	48	191	9	182(95.3)
5	1	-	4	-	-	-	5	0	5(100.)
6	10	23	23	17	14	21	108	9	99(91.7)
7	12	8	20	10	6	2	58	3	55(94.8)
8	26	22	19	21	22	31	141	12	129(91.5)
Total	171	174	267	212	223	245	1292	95	1197(92.6)

Remarks: 1) To assure confidentiality of information, the title of facility is not specified.
2) This is the number of imcomplete or inconsistent birth certificates even after correction.
3) The number in parenthesis is the percentage of the completed birth certificates of those collected.

in community setting in Chungju and Chungwon area, only 75.5 per cent were on the newborns of the mothers residing in the study area, and 24.5 per cent were on the newborns of the mothers residing outside of the study area.

The birth registration system in Korea is based on current or permanent residence, not on the place of birth. It is thus recommended for the project to design a data collection system in which all the birth-related data of the newborns delivered by the mothers residing in the target area can be collected.

However, the births do not always occur within the health

and medical institutions in their mother's residence. The mothers residing in Chungju and Chungwon area give births in:

① health and medical institution within their residence,
② home within their residence,
③ health and medical institution outside their residence, or
④ home outside their residence.

The project staff thus collected the birth-related data of the children born in the health and medical institutions in Chungju and Chungwon area only. For this project, the data of the births deliverd at home in Chungju and Chungwon, and those born outside Chungju and Chungwon area were not collected.

It is not however confirmed that the project could cover all the children born in the health and medical institutions during a given period of the model study. It may be possible that a health and medical institution might have missed to complete a birth certificate of the newborn, especially when a death occurs right after his/her birth. In such a case both birth and death certificates of the child was probably not completed at all.

4. Completeness and Accuracy in Recording Each Item of the Revised Birth Certificates

1) Frequency of the Items with Errors in Recording

Of 984 birth certificates collected from the participating hospitals in Seoul and Taegu, the project staff queried 599 imcomplete or inconsistent certificates, and sent them back to

the hospital personnel.

The items left blank were mainly found on the general information concerning (1) father and mother of the newborn, (2) name of the newborn, (3) fertility and pregnant history of mother, (4) abortion experience, and (5) prenatal care. For example, of 984 birth certificates, 257 certificates did not identify the parity of the newborn. Many certificates did not identify the residence registration number (103 cases), did not record the permanent address (102 cases), or left blank the information on occupation of the father (69 cases).

The reason that many certificates letf blank on the items about the father of the newborn stems from the different persons and places in birth certificate. The birth certificate of the newborn in the target institutions in Seoul and Taegu was prepared and completed by a physician or nurse in delivery room. The information on the father of the newborn cannot be collected from medical record of the delivery room, but can be collected through a direct interview with the parents of the newborn.

The parity of the newborn was not identified in 257 birth certificates. The project staff explained in the physicians' handbook on completing the revised birth certificate that the form is designed for recording the parity of the newborn along with the item of 'name of the newborn.' However, it is usual in Korea that the parents of the newborn do not name right after

its birth. Therefore, the item of 'name of the newborn' was left blank in many birth certificates.

In 163 certificates the mothers answered they had some experience of abortion, but did not identify the year and month of the last abortion. It may be because either the physicians did not ask the date of the last abortion, or the mothers did not provide the answer to the question of the date of the last abortion during prenatal care. Even though the mother received prenatal care, the number of the month in this pregnancy when the mother first received prenatal care was not identified (in 57 cases). Also the number of visits made for prenatal care was not entered (in 93 cases). The reasons that many certificates letf blank on such items comes from the recording system of birth certificate. The birth certificate of the newborn in the target institutions in Seoul and Taegu was prepared and completed by a physician or nurse in delivery room. However, the information on the prenatal care the mother received during this prgnancy cannot be collected from medical record of the delivery room.

After the study staff reviewed and examined the birth certificates, and queried incomplete and inconsistent birth certificates. Of 984 birth certificates collected from the participating hospitals in Seoul and Taegu, 599 certificates were found to be corrected or completed again. The study staff sent these 599 birth certificates back to the institutions for

still found in 158 birth cetificates. The frequency of errors by item in the birth certificate is summarized in <Table-5>.

The recording error most ferquently found in the birth certificates, even after being corrected or receompleted, is no recording on the month of the last abortion. In 60 certificates, though the number of spontaneous and induced abortion was enterd, but the date (month and year) of the last abortion was not identified at all. It was assumed that the physicians didnot ask the date of the last abortion, or because the mothers didnot answer to the question of the date of the last abortion during the period of prenatal care. In these cases, the information about the date of the last abortion could not be found from any of written records filed in the institution..

The study staff reviewed every month the birth certificates collected from study area in Chungju and Chungwon. The errors found in the birth certificates from Chungju and Chungwon area were examined and tabulated two times: the one for the first-half (between June and August), and the other for the last-half (between September and November) of the project period. The separation of the data collected during the first- and last-half period was made to assess the impact of education on improving the quality of the data. The study staff visited the target community at least once a month, and collected the birth certificates collected and verified by the health center personnel. During their stay in the community, the study staff

correction.

The study staff collected and examined the corrected or recompleted birth certificates. Some errors in recording were

<Table-5> Number of Errors by Items on Birth Certificate: Institution-based Study

Items		Ins.1	Ins.2	Ins.3	Ins.4	Ins.5	Total
Certificates Collected		224	195	156	209	200	984
Certificates with Errors		29	9	42	49	29	158
1	father	6	6	22	4	11	49
	mother	0	5	7	3	3	18
2	address of mother	0	0	0	0	0	0
3	place of birth	0	0	0	0	0	0
4	date/time of birth	0	0	1	0	3	4
	sex	0	0	2	1	3	6
	name of child	0	0	0	0	0	0
5	length of gestation	0	0	0	0	0	0
6	plurality	0	0	0	0	0	0
7	pregnancy history	0	0	0	2	0	2
10-1	educatin of mother	0	0	1	5	0	6
10-2	transfer of mother	0	0	0	1	0	1
10-3	marital status	0	0	0	0	0	0
10-4	abortion	15	2	13	27	3	60
10-5	last live birth date	7	1	3	12	0	23
10-6	prenatal care	3	2	4	1	6	16
10-7	gestation (in weeks)	0	0	0	1	1	2
10-8	obstetric procedures	0	0	0	0	0	0
10-9	risk factors	0	0	0	0	1	1
10-10	method of delivery	0	0	0	1	0	1
10-11	complications	2	0	0	0	2	4
10-12	birth weight	0	0	0	0	0	0
10-13	Apgar score	0	0	0	0	0	0
10-14	abnormal conditions	0	0	0	0	0	0
10-15	congenital anomalies	0	0	0	0	0	0

monitored progress of the project activities, coped with field problems faced by the field staff, and handled inquiries from the field. This education and training process contributed to improve the quality of the information on the birth certificate.

During the first-half period of the project in Chungju and Chungwon area, 612 birth ertificates were collected from 8 birth-related institutions in the community. There were found 95 certificates (15.4 per cent) incomplete or inconsistant. The errors were most frequently found in the items about personal informations of mother and father, name of child, educational attainment of mother, the date of last abortion, pregnancy prenatal cares, estimation of gestation, and Apgar score of child. The permanent address, occupation, and educational attainment of mother were left blank in many certificates (in 25, 23 and 8 birth certificates, respectively). The items on the permanent address and occupation of father were also found blank in more than 10 birth certificates (15 and 14 cases, respectively).

The item on the year and month of the last abortion was left blank in 11 birth certificates where the number of spontaneous and induced abortion was identified. It is assumed that incompleteness of the item about the date of last abortion is due to same reason examined in the institution-based study project in Seoul and Taegu. The physicians did not ask the date of the last abortion, or the mothers did not answer to the

question of the date of the last abortion during the period of prenatal care. Of the birth certificates indicating prenatal care, 14 cases had the items blank on the number of the month in this pregnancy when the mother first received prenatal care from a physician or other health professional.

The study staff sent 95 birth certificates found incomplete or inconsistent back to the institutions for correction. Even after correction, some errors were still found in 56 birth cetificates. The frequency of errors by item in the birth certificate is summarized in <Table-6>. The errors were found in the items on father of the newborn (21 cases), mother of the newborn (20 cases), spontaneous and induced abortion (15 cases), and prenatal cares (16 cases).

Compared to errors found in the birth certificates collected during the first-half period of the project, much less errors were found in the birth certificates collected during the last-half of the project period. Of 680 birth certificates collected during the last-half period, only 59 certificates were incomplete or inconsistent. The errors were found in the items about personal informations of father (6 cases), the date of last abortion (10 cases), the date of last birth (9 cases), and estimation of gestation period (5 cases). The frequency of errors after correction is summarized in <Table-7>.

<Table-6> Errors by Items on Birth Certificate:
The First-half Period of the Community-based Study Project

	Items	Inst. 1	Inst. 2	Inst. 3	Inst. 4	Inst. 5	Inst. 6	Inst. 7	Inst. 8	Total
Certificates Collected		123	107	121	93	5	56	40	67	612
Certificates with Errors		7	15	14	7	0	5	1	7	56
1	father	4	10	3	0	0	3	0	1	21
	mother	0	9	3	2	0	0	0	6	20
2	address of mother	0	0	1	0	0	0	0	0	1
3	place of birth	0	0	0	0	0	0	0	0	0
4	date/time of birth	0	0	0	0	0	0	0	0	0
	sex	0	0	0	0	0	1	0	0	1
	name of child	0	0	0	0	0	0	0	0	0
5	length of gestation	0	0	0	0	0	0	0	0	0
6	plurality	0	0	0	0	0	0	0	0	0
7	pregnancy history	0	0	0	0	0	0	0	1	1
10-1	educatin of mother	0	2	0	0	0	0	0	3	5
10-2	transfer of mother	0	0	0	0	0	0	0	0	0
10-3	marital status	0	0	0	0	0	0	0	0	0
10-4	abortion	1	3	5	3	0	1	0	2	15
10-5	last live birth date	1	2	0	3	0	0	0	0	6
10-6	prenatal care	0	8	5	1	0	1	1	0	16
10-7	gestation (in weeks)	0	0	0	0	0	0	1	0	1
10-8	obstetric procedures	0	0	2	0	0	0	0	0	2
10-9	risk factors	0	0	0	0	0	0	0	0	0
10-10	method of delivery	0	0	0	0	0	0	0	0	0
10-11	complications	1	1	0	0	0	0	0	0	2
10-12	birth weight	0	0	0	0	0	0	0	0	0
10-13	Apgar score	0	0	1	0	0	0	0	1	2
10-14	abnormal conditions	0	1	0	0	0	0	0	0	1
10-15	congenital anomalies	0	0	0	0	0	0	0	0	0

<Table-7> Errors by Items on Birth Certificate:
The Last-half Period of the Community-based Study Project

Items		Inst. 1	Inst. 2	Inst. 3	Inst. 4	Inst. 5	Inst. 6	Inst. 7	Inst. 8	Total
Certificates Collected		168	146	124	98	0	52	18	74	680
Certificates with Errors		7	14	5	2	0	4	2	5	39
1	father	0	1	0	0	0	3	0	2	6
	mother	0	1	0	0	0	1	1	0	3
2	address of mother	0	0	0	0	0	0	0	0	0
3	place of birth	0	0	0	0	0	0	0	0	0
4	date/time of birth	0	1	0	0	0	0	0	0	1
	sex	0	0	0	0	0	0	0	0	0
	name of child	0	0	0	0	0	0	0	0	0
5	length of gestation	0	0	0	0	0	0	0	0	0
6	plurality	0	0	0	0	0	0	0	0	0
7	pregnancy history	0	0	0	0	0	0	0	0	0
10-1	educatin of mother	1	0	0	0	0	0	0	0	1
10-2	transfer of mother	0	0	0	0	0	0	0	0	0
10-3	marital status	0	0	0	0	0	0	0	0	0
10-4	abortion	3	2	1	1	0	1	1	1	10
10-5	last live birth date	1	2	2	1	0	2	0	1	9
10-6	prenatal care	0	1	2	0	0	0	0	1	4
10-7	gestation (in weeks)	0	5	0	0	0	0	0	0	5
10-8	obstetric procedures	1	0	0	0	0	0	0	1	2
10-9	risk factors	0	0	0	0	0	0	0	0	0
10-10	method of delivery	0	1	0	0	0	0	0	0	1
10-11	complications	1	0	0	0	0	0	0	0	1
10-12	birth weight	0	0	0	0	0	0	0	0	0
10-13	Apgar score	0	0	0	0	0	0	1	0	1
10-14	abnormal conditions	0	0	0	0	0	0	0	0	0
10-15	congenital anomalies	0	0	0	0	0	0	0	0	0

2) Agreement with the Obstetric Records[1)]

In order to find out why some birth certificates are incomplete or inconsistent, the study staff examined whether or not the informations in 203 birth certificates collected from one of the participating institutions of the project agree with the informations in the obstetric record of the mother and pediatric record of the newborn in the same hospital.

Of 203 birth certificates, the study staff could not find the ostetric and pediatric records for 9 cases. The number of the birth certificates based on incomplete obstetric or pediatric records was four. Five birth certificates were duplicated in recording the same birth, and one birth certificate was not identified with any obstetric and pediatric records.

The study staff thus compared the informations in 184 birth certificates with the informations in the matched obstetric and pediatric records. The process of comparision was composed in two steps. We first examined whether the information required on birth certificates was complete or not. For the items complete in the birth certificates, we classified the items into three possibilitie: ① the information in the birth certificate agreed with the information in the obstetric and pediatric records; ② the information in the birth certificate does not agree with that in medical records; and ③ the information in the certificate was not entered in the obstetric or pediatric records at all. For the items not complete in the birth

<Table-8> Comparison of the Information of Birth Certificate and Medical Records

Informations	Completed in birth certificate						Not-completed in BC			
	agree with med record		not-agree w/ record		not in med record		in med record		not in med record	
	No.	%	No.	%	No.	%	No.	%	No.	%
1) the items of the current form										
Father name	184	100.0	0	-	0	-	0	-	0	-
age	47	25.5	28	15.2	4	2.2	63	34.2	42	22.8
RR number	0	-	0	-	176	95.7	0	-	8	4.3
permanent address	0	-	0	-	180	97.8	0	-	4	2.2
occupation	157	85.3	17	9.2	0	-	6	3.3	4	2.2
Mother name	183	99.5	1	0.5	0	-	0	-	0	-
age	49	26.6	25	13.6	2	1.1	108	58.7	0	-
RR number	0	-	0	-	181	98.4	0	-	3	1.6
permanent address	0	-	0	-	106	57.6	0	-	78	42.4
occupation	73	39.7	0	-	1	0.5	2	1.1	108	58.7
Address of mother	165	89.7	19	10.3	0	-	0	-	0	-
Place of birth	184	100.0	0	-	0	-	0	-	0	-
Date and time of birth	173	94.0	11	6.0	0	-	0	-	0	-
Estimation of gestation	159	86.4	5	2.7	0	-	20	10.9	0	-
Sex	176	95.7	2	1.1	0	-	6	3.3	0	-
Name of child	0	-	0	-	0	-	0	-	0	-
Plurality	4	100.0	0	-	0	-	0	-	0	-
Pregnancy and Fertility	84	45.7	22	12.0	0	-	78	42.4	0	-
Physical status	157	85.3	0	-	0	-	27	14.7	0	-
Health status	9	5.0	0	-	0	-	175	95.1	0	-
2) the items added in the revised form										
Education of mother	0	-	0	-	184	100.0	0	-	0	-
Transfer of mother	179	97.3	4	2.2	0	-	0	-	1	0.5
Marital status of mother	183	99.5	1	0.5	0	-	0	-	0	-
Abortion experience	107	58.3	21	11.4	2	1.1	4	2.2	50	27.2
Month of last abortion	150	81.5	7	3.8	10	5.4	6	3.3	11	6.0
Month of last birth	162	88.0	6	3.3	9	5.0	7	3.8	0	-
Prenatal care	183	99.5	1	0.5	0	-	0	-	0	-
Month of first care	0	-	0	-	182	98.9	0	-	2	1.1
Frequency of cares	0	-	0	-	179	97.3	0	-	5	2.7
Gestation (in weeks)	92	50.0	82	44.6	1	0.5	8	4.3	1	0.5
Obstetric procedures	171	92.9	1	0.5	1	0.5	11	6.0	0	-
Related risk factors	168	91.3	0	-	2	1.1	14	7.6	0	-
Method of delivery	169	91.8	3	1.6	0	-	12	6.5	0	-
Complications of L/D	101	54.9	0	-	2	1.1	81	44.0	0	-
Weight at birth	175	95.1	8	4.3	0	-	1	0.5	0	-
Apgar score	151	82.1	33	17.9	0	-	0	-	0	-
Abnormal conditions	153	83.2	0	-	0	-	31	16.8	0	-
Congenital anomalies	182	98.9	0	-	0	-	2	1.1	0	-

certificates, we examined whether or not the information required on the item can be collected from the obstetric or pediatric records. <Table-8> presents the classification of 184 birth certificates by items and types of agreement.

Of the informations on the parents of the new born, one certificate had differnt name of mother from that in obstetric record. The age of father in 28 birth certificates, and the age of mother in 25 certificates were different from those in obstetric and pediatric records. For the 19 cases the current address of mother in the birth certificate was different from that in the obstetric record. Even the date of birth was differently entered in the birth certificate and obstetric record for 11 cases. On the information about gestation, 5 birth certificates had the month of gestation different from that in the medical records. On the pregnancy history and fertility, only 84 cases (45.7%) agree with each other in birth certificate and medical record. For 78 cases, while the pregnancy history and fertility were entered in the medical records, but the items on this were left blank in birth certificates.

The reasons that some items in birth certificate were left blank and the information in birth certificate did not agree with the information in medical records are found in the completing system of birth certificate. This hospital used a worksheet to accumulate the information needed to complete birth certificate. The worksheet was provided to the expactant father or mother,

and was completed by the mother or mother prior to admission to the hospital for the delivery. However, the general informations about the parents obtained through the worksheet were different from the informations entered in the obstetric record of the mother. The physician in the delivery room collected the informations required on birth certificate mainly from the worksheet.

Of the items added to the current birth certificate form, the estimated weeks of gestation in the revised birth certificate is different from the estimation in the obstetric and pediatric records for 82 births (44.6%). The consistency rates between birth certificate and medical record on the informations about obstetric procedures, risk factors, and method of delivery were higher than 90 per cent. However, complications of labor and delivery entered in the medical records were not checked in birth certificate for 81 births (44%). There were 33 births (17.9%) whose Apgar score in birth certificate was different from that in medical records. For 31 births (16.8%), the abnormal condition of the newborn was checked in medical records, but not in birth certificate.

Notes:

1) Partially cited from Park (1992)

Chapter Ⅳ
TABULATION OF THE BIRTH-RELATED DATA

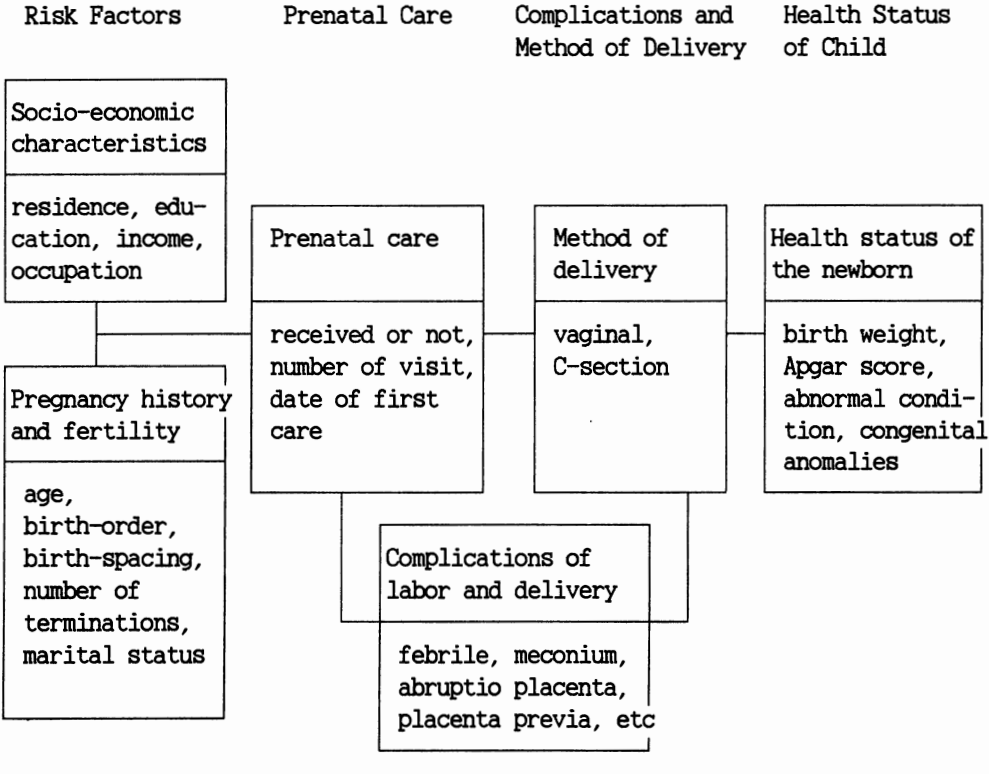
1. Conceptual Frame of Tabulation

The new items included in the revised form are interrelated and their relationship is conceptualized in <Figure-2>. The expectant mother's experience of risk factors during the pregnancy affects the health conditions of the mother and the newborn. Many literatures has indicated that that the risk factors include the variables related to socio-economic characteristics, pregnancy history and fertility of the mother, and types of prenatal cares used during the pregnancy etc.

The socio-economic characteristics of the mother includes residence, educational attainment, occupation, and monthly income. The variables on pregnancy history and fertility are age of the mother, number of pregnancy and live births, number of pregnancy loss, and interval between this birth and last live birth or other terminations. The safety of delivery and health conditions of the mother and the newborn are much affected by the number of the month in this pregnancy when the mother first received prenatal care, the number of prenatal visits, and the medical risk factors that the mother experienced during the pregnancy.

The safety of delivery may be related to the method of delivery and complicatins of labor and delivery. The birth weight of the child, Apgar score, and congenital anomalies can be used to measure the health conditions of the newborn.

<Figure-2> Variables Affecting Health Conditions at Birth



2. Methods of Tabulation

We tabulated the data collected from birth certificates by: ① the variables related to the characteristics of mother and child, such as residence of mother, and medical and health facitilis, ② frequency of risk factors for this pregnancy, ③ status of receiving prenatal cares, and ④ health status of mother and child at birth. In this report only the marginal tables are presented for information to get a general impression on the frequency and distribution of each variable.

3. Findings from the Tabulated Data

1) General Characteristics of Mother

① Geographic distribution of mother: <Table-9> presents the general characteristics of the mothers who delivered the newborn at the health and medical institutions in Chungju and Chungwon area during the project period. Of 1,292 mothers in the project area, 75.7 per cent delivered at the medical institutions located in the same area as their current residence, and 8.3 per cent in the facilities located in the other cities or counties in Chungbuk province. The percentage of the mothers whose residence is in other province of the project area was 16.2 per cent. When the mothers in other communities or provinces make a birth, it is very difficult for the health center

to make a follow-up care of the mother and child residing in other area.

② Educational attainment: Of the mothers who made births in medical facilities in Chungju and Chungwon area, 74.2 per

<Table-9> General Characteristics of Mothers

Characteristics	Community-based N	%	Institution-based N	%
Total	1,292	100.0	984	100.0
Residence				
Chungju Shi	780	60.4		
Chungwon Kun	196	15.2		
Other in Chungbuk	100	7.7		
Other province	215	16.6		
Unknown	1	0.1		
Educational attainment				
Junior or less	321	24.9	76	7.8
Senior high school	822	63.6	504	51.2
College or more	143	11.0	398	40.4
Unknown	6	0.5	6	0.6
Age				
15-19	29	2.2	8	1.6
20-24	440	34.1	179	18.2
25-29	632	48.9	552	56.1
30-34	164	12.7	217	22.1
35+	26	2.0	28	2.8
Unknown	1	0.1	-	-
Occupation				
Working	67	5.2	159	16.2
Not-working	1,225	94.8	825	83.8

cent completed junior high school or higher formal education, while 24.8 per cent did not complete junior high school. One of the previous study done in 1988 showed that 54.9 per cent of the mothers received the formal education of senior high school and more. The higher educational attainment of the

mothers in this project was due to exclusion of the mothers of home delivery from the tabulation.

The mothers who delivered at the participating hospitals in Seoul and Taegu show higher educational attainment than those of community-based model study in Chungju and Chungwon area. The percentage of the mothers who receivied the formal education of senior high school or higher was 91.6 per cent.

③ Age: Of the mothers of the community-based study, 48.7 per cent were 25-29 years old, and 34.3 per cent were 20-24 years old. The mothers who made births before the their age of 19 years or less, and 35 years or more were 4.0 per cent (2.1% for before 19 years or less, and 1.9% for 35 years or over). Of the mothers of the institution-based model studyin Seoul and Taegu, 56.1 per cent were 25-29 years old, and 22.1 per cent were 30-34 years old. The percentage of mothers who made births during their late twenties and early thirties was 78.2 per cent.

2) Pregnancy and Fertility of Mother

Four variables were assumed to be related to fertility of

the mothers. Those are marital status, number of live births, number of spontaneous and induced abortions, and interval between the last birth and this birth. The summary of pregnancy history of mothers is presented in <Table-10>.

<Table-10> Pregnancy and Fertility of Mothers

Variables	Community-based N	Community-based %	Institution-based N	Institution-based %
Total	1,292	100.0	984	100.0
Marital status				
Not-married	31	2.4	19	1.9
Married	1,261	97.6	965	98.1
Number of live births				
0	704	54.5	587	59.7
1	484	37.5	340	34.6
2	74	5.7	50	5.1
3 and more	30	2.3	7	0.7
Number of induced abortion				
0	818	63.3	592	60.1
1 and more	474	36.7	392	39.9
Interval between last and this births				
same day (plurality)	4	0.4	8	0.8
< 1 year	9	0.9	6	0.6
1 - 2 years	195	15.1	106	10.8
2 - 3 years	178	13.8	104	10.6
3 - 4 years	102	7.9	65	6.7
4 - 5 years	36	2.8	36	3.6
5+ years	57	4.4	47	4.8
first birth	708	54.7	612	62.1

In the community-based study, 27 mothers (2.4%) were unmarried, while 2.4 per cent of the mothers of the institution-based study were unmarried. During the project period the birth certificates showed that more than half of the mothers delivered the first live birth. The rate of first live birth is 53.3 per cent in the community-based study, and 59.7 per cent in the institution-based study.

The proportions of the mothers who experienced the induced abortion were 37.0 per cent in the community-based study, and 39.9 per cent in the institution-based study. The rate of spontaneous abortion is higher for the mother of the institution-based study than the mothers in the community-based study. They were 10.0 per cent and 14.0 per cent, respectively.

3) Prenatal Care

We examined the questions on when and and how many times the expectant mothers received the prenatal cares during this pregnancy. The findings on prenatal care are presented in <Table-11>. The proportion of the mothers who received any prenatal care was 86.2 per cent in the community-based study, and 94.9 per cent in the institution-based study.

Of mothers of the community-based study, 65.6 per cent had received prenatal care six times or less during their pregnancy, while only 47.7 per cent of the mothers in the institution-based study had received six times or less. There

was not much difference in the month when the mother first received prenatal care between the community-based and institution-based study. In the the community-based study 41.3 per cent of the mother first received the prenatal care during or before the third month of this pregnancy, and 46.6 per cent of the mother of the institution-based study did so.

<Table-11> Prenatal Cares during this Pregnancy

Variables	Community-based N	%	Institution-based N	%
Total	1,292	100.0	984	100.0
Number of prenatal care				
0	182	14.1	51	5.2
1 - 3	326	25.2	185	18.9
4 - 6	340	26.3	217	22.0
more than 7	444	34.4	516	52.3
Month of pregnancy of the first visit				
no visit	182	14.1	51	5.2
< 3 months	534	41.3	456	46.3
4-6 months	228	21.7	192	19.5
more than 7 months	333	30.8	277	28.2
Unknown	15	1.2	8	0.8

4) Labor and Delivery

① Estimation of gestation period: The length of gestation period was asked to record after computing from the date last normal menses began and the date of birth. When the length of

gestation for a birth is between 37 and 42 weeks, the birth is assumed to be normal in time. The length of gestation for a preterm birth is in general between 28 and 36 weeks, and for a postterm birth is 43 weeks or longer.

The proportion of the newborn after normal length of gestation were 71.4 per cent and 70.5 per cent, for the mothers of the community-based and institution-based model study respectively. The percentage of preterm infants was 5.9 per cent in the data from the institution-based study, which is much higher than 1.8 per cent from the community-based study (Table 12).

② Obstetric procedures: Among the obstetric procedures made for medical supervision during the pregnancy, the ultrasound was the most frequently used one. Of the mothers in the institution-based model study, 72.0 per cent received the ultrasound test at least once, while the proportions of the mothers receiving electronic fetal monitoring and amniocentesis are 26.6 per cent and 0.4 per cent only, respectively.

The ultrasound test was also the obstetric procedure used most frequently for the mothers of the institution-based study in Seoul and Taegu. Of mothers in the institution-based study 72.4 per cent had received the ultrasound test during their pregnancy. However, the proportions of the mothers receiving electronic fetal monitoring and amniocetesis were much higher for the mothers in the institution-based study than the community-based study, indicating 52.5 per cent and 2.5 per

cent respectively. The rates of induced labor and stimulated labor were 19.9 per cent and 20.6 per cent respectively in the findings of the institution-based study, which were much higher than the community-based study.

③ Medical risk factors for pregnancy: There were significant differences in the rates of medical risk factors between the findings of institution-based and community-based study. While 10.7 per cent of the mothers in community-based study had experienced some risk factors during their pregnancy, 31.5 per cent in institution-based study had. The distribution of risk factors that the mothers experienced during their pregnancy showed some difference between the institution-based and community-based study. The risk factors that the mothers of community-based study experienced most frequently were hemoglobinopathy, prgnancy-associated hypertension, and uterine bleeding, while hemoglobinopathy, prgnancy-associated hypertension, previous infant preterm or small-for-gestational-age, previous infants 4000+ grams, and renal disease were the more frequent medical risk factors among the mothers in the institution-based study.

④ Complications of labor and delivery: In the revised birth certificate, 15 types of complications of labor and delivery were included to be checked. One or more medical complications were present during labor and/or delivery among 36.8 per cent of the mothers in the community-based study, and 36.9 per

cent of the the mothers in the institution-based study. Cephalopelvic disproportion (15.7%), meconium (5.7%), and premature rupture of membrane (5.4%) were present most frequently among the mothers of the institution-based study,

<Table-12> Pregnancy and Fertility of Mothers

Variables	Community-based N	%	Institution-based N	%
Total	1,292	100.0	984	100.0
Facility of delivery				
Hospital	544	42.1	984	100.0
Clinic	549	42.5		
Mother-child center	58	4.5		
Midwife post	141	10.9		
Estimatin of gestation				
37 and less weeks	55	4.3	106	10.7
38-40 weeks	893	69.1	664	67.4
41-42 weeks	329	25.4	206	21.0
43+ weeks	9	0.7	8	0.7
Unknown	6	0.5	-	-
Obstetric procedurs*				
Amniocentesis	5	0.4	25	2.5
Electronic fetal monitoring	344	26.6	517	52.5
Ultrasound	930	72.0	717	72.9
Induction of labor	90	7.0	196	19.9
Stimulation of labor	45	3.5	203	20.6
Tocolysis	2	0.2	84	8.5
Others	21	1.6	6	0.6

* The percentages are based on 1,292 for the community-based study, and 984 mothers for the institution-based study.

while premature rupture of membrane (9.3%), cephalopelvic disproportion (7.9%), and meconium (4.9%) were reported more frequently in the community-based study.

5) Health Status and Abnormal Conditions of the Newborn

The health status of the newborn is measured by several inducators, such as birth weight, 1-minute and 5-minute Apgar scores, abnormal conditios, and congenital anomalies of the child. Of the 1,292 children in the community-based study, 45 children were born in 2500 grams or less (3.4%), while 80 of the 984 children in the institution-based study (8.2%) were 2500 grams or less.

<Table-13> Complications of Labor and Delivery

Variables	Community-based N	Community-based %	Institution-based N	Institution-based %
Total	1,292	100.0	984	100.0
Medical risk factors for pregnancy				
One or more	138	10.7	311	31.6
None	1,154	89.3	672	65.3
Unknown	-	-	1	0.1
Complications of labor and delivery				
One or more	475	36.8	363	36.9
None	817	63.2	619	62.9
Unknown	-	-	2	0.2
Method of delivery				
Vaginal	902	69.8	685	69.6
Primary C-section	296	22.9	190	19.3
Repeat C-section	93	7.2	108	11.0
Unknown	1	0.1	1	0.1

<Table-14> Health Status and Abnormal Conditions of Child

Variables	Community-based N	Community-based %	Institution-based N	Institution-based %
Total	1,292	100.0	984	100.0
Birth weight of child				
< 2500g	45	3.5	80	8.2
2500-3000g	313	24.2	234	23.8
3000-3500g	634	49.1	449	45.6
3500-4000g	249	19.3	193	19.6
4000g+	51	3.9	28	2.8
Apgar score (1 minute)				
3 or less	8	0.6	13	1.3
4-6	33	2.6	69	7.0
7+	1,249	96.6	902	91.7
Unknown	2	0.2	-	-
Abnormal conditions of child				
One or more	20	1.5	63	6.4
None	1,171	98.4	921	93.6
Unknown	1	0.1	-	-
Congenital anomalies of child				
One or more	4	0.3	12	1.2
None	1,288	99.7	972	98.8

The Apgar score is used to evaluate the physical condition of the newborn at birth. In community-based study, the delivery room personnel assigned The Apgar score of 6 or less to 5.2 per cent of the infants in 1 minute after birth, and to 0.8 per cent in 5 minutes after birth. Of the infants in the institution-based study 8.2 per cent were received the Apgar

score of 6 or less in 1 minute after birth, and 1.3 per cent after 5 minutes after birth.

The proportions who had experienced one or more complications during their labor and delivery were 1.5 per cent in community-based study, and 6.4 per cent in the institution-based study. One or more abnormal conditions were identified among 20 infants (1.5%) of the community-based study, and among 63 infants (6.4%) of the institution-based study. The rates of congenital anomalies were 0.3 per cent in the community-based study, and 1.2 per cent in the institution-based study.

4. Suggested Use of the Data in the Revised Birth Certificate

If the health and medical informations in the revised birth certificate are collected well on national or local bases, they are considered to be useful in preparing national statistics of mother and child health, in planning, evaluating, and adminstering the mother and child health activities both at national and local levels. The data can be also used for research purpose by the health departments and other agencies, and academic groups interested in the fields of medical science, public health, demography, and social welfare.

1) Identifying and Monitoring High Risk Infants and Mothers[1)]

① Prevention of Congenital Anomalies: The informations collected from the items on congenital anomalies in the revised birth certificate can be used to monitor the incidence of the congenital anomalies by yaer, and to study the relationship between the prevalence of anomalies and other characteristics of the mother, infant, and the environment. The informations collected from the revisd birth certificate can be also used to identify the extent to which the medical risk factors such as old-aged mother, previous experience of anomalies, and diabetes relate to occurence of congenital anomalies of child, which helps making health policies aimed to prevent the incidence of congenital anomalies.

② Prevention of Low-birth Weight Infant: The birth weight of the child is highly related to infant mortality. And the infants with low birth weight require the neonatal intensive cares, which, in turn, implies expensive medical expences.

The birth weight of the child is also related to prenatal care, socioeconomic status, marital status, and other factors surrounding the birth. Consequently, the information on the birth weight of child can be used with other information such as prenatal care in the revised birth certificate to plan for and evaluate the effectiveness of health care.

③ Prevention of Suffocation of Infant: The Apgar score is one of the most reliable meaure for evaluating the physical condition of the infant at birth, and is highly related to RDS of

the infant. The infant scored 3 or less by the delivery personnel 5 minutes after birth will more probabily experience any of central nervous system anomalies in future than other infants.

The reason of incidence of RDS can be identified through analysis of the relationships between risk factors of mother, complications of labor and delivery, and low Apgar score of infant at birth, which helps prevent the incidence of RDS.

④ Monitoring of Highly Risk Mothers: The information collected from revised birth certificate allows for the identification of specific maternal conditions that are often predictive of poor maternal and infant outcome. It can be used for planning intervention and prevention strategies.

2) Preparing the Health Statistics for Mother and Child

Using informations collected from the revised birth certificate, the related agencies can develop various health statistics as follows:

Demographic Factors
Distribution of expectant mothers by age
Distribution of expectant mothers by fertility
Distribution of expectant mothers by economic activity status
Distribution of expectant mothers by educational attainment

Pregnancy History and Fertility
Distribution of expectant mothers by number of induced abortion
Distribution of expectant mothers by number of other pregnancy termination
Distribution of expectant mothers by previous preterm infant
Distribution of expectant mothers by previous C-section

Distribution of expectant mothers by previous anomaly of child

Risk Factors for this Pregnancy
Incidence rate of plurality
Incidence rate of pregnancy-associated anemia
Incidence rate of Rh sensitization
Incidence rate of pregnancy-associated hypertension
Incidence rate of diabetes
Incidence rate of incompetent cervix
Incidence rate of other complications of pregnancy

Complications of Labor and Delivery
Incidence rate of induction or stimulation of labor
Incidence rate of placenta previa
Incidence rate of abruptio placenta
Incidence rate of fetal distress
Incidence rate of anesthetic complications
Incidence rate of excessive bleeding

Prenatal Care
Distribution of mothers by month of pregnancy when care began
Distribution of mothers by number of prenatal visits
Distribution of mothers by content of prenatal care received

Delivery and Postnatal Care
Distribution of delivery by methods
Distribution of delivery by qualification of attendant
Distribution of delivery by facility

Physical Condition and Anomalies of Child
Incidence rate of the child with low Apgar score
Incidence rate of meconium aspiration syndrom
Incidence rate of cromosal anomalies of child
Incidence rate of congenital anomalies of child
Incidence rate of anomalies by reason

3) Use of the Data for Health Activities at Community Lavel

① Roster of Mothers and Children: Using the information collected from the birth certificates, the community health

center can make a name of the children whose birth occurred in the community. The list of mothers and children can be used not only to develop vital statistics, but also in planning, evaluating, and administering local health activities.

During the project period the study staff prepared the form of list of mothers and children in Chungju area. The form contained the information of the child and its mother, such as the abnormal condition associated with the newborn infant, the weight at birth, Apgar scores, and complications of labor and delivery (see Figure-3).

② List of the Mothers Requiring a Special Health Care: From the list of mothers and children, the community health center can identify the target mothers for a special health care. Those who received few or no prenatal care, experienced risk factors during the pregnancy or complications of labor and delivery can be the target population for their special health care. A sample form for listing the mothers was also prepared during the project period, and is presented in <Figure-4>.

③ List of the Children Requiring an Intensive Care: Using the informations reported in the revised birth certificates, the community health center can also list the children who need for intensive care. If a child is associated with any of congenital anomalies, or with any abnornal conditions, the child is listed. The form for this list contains the informations such as wight at birth, Apgar score, type of abnormal condition, and congenital

anomalies (see Figure-5).

<Figure-3>

List of Mothers and Children

Date:

Chungju Shi Health Center

Seq. ① No.	Birth ② Date	Reg. ③ Date	Name of ④ Mother	Name of ⑤ Child	⑥ Address	Birth Place ⑦ (facility)	Of child		⑩Abnormal condition		⑪ Remarks
							⑧ Weight	⑨ Apgar	Mother	Child	
1							gm				
2							gm				
3							gm				
4							gm				
5							gm				
6							gm				
7							gm				
8							gm				
9							gm				
10							gm				
11							gm				
12							gm				
13							gm				
14							gm				
15							gm				

<Figure-4>

List of Mothers Requiring Specific Cares

Date:

Chungju Shi Health Center

Seq. No.	Name of Mother	Address	Of delivery		Name of Child	No. of LBS	Marital Status	Gestation (wks)	Age	Date of First Pre. Care	Of Mothers			Remarks
			Date	Place							Risk factor	Deliv. method	Compli-cation	

<Figure-5>

List of Children Need for Intensive Cares

Date:

Chungju Shi Health Center

Seq. ① No.	Name ② of Mother	③ Address	Date ④of Delivery	Place ⑤ of Birth	Name ⑥ of Child	⑦Phy. Condition			⑧Abnormal Condition		⑨ Remarks
						Birth weight	Apgar 1	5	general Types	congenital types	
						gm					
						gm					
						gm					
						gm					
						gm					
						gm					
						gm					
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						gm					
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						gm					
						gm					

Notes:

1) The findings of the Survey on Management of Hospital Delivery (1980: 31) shows that the complications are present the least frequently among women in the their early thirties, and relatively more frequently among the group of women aged 20-24 years (27.11 %) and aged 40 years and over (31.94 %).
2) Partially cited from Seo (1992).

Chapter V
EVALUATION OF THE STUDY PROJECT

The evaluation of the project was conducted to examine the implementation process, and to find out the problems, if any, in implementing the project. Feasibility of collecting medical and health information on newborn and mother by introducing a revised birth certificate in Korea was evaluated. The methods of evaluation were:

(1) to assess the completing process of the revised birth certificate;

(2) to query incomplete or inconsistent certificates, and assist some programs to improve completeness and accuracy of certificate;

(3) to conduct interviews to identify the different birth certification system in the facilities; and

(4) to hold a seminar on findings and policy implications of the project.

1. Evaulation on Completing Process of the Revised Birth Certificate

1) Items Difficult to Collect in the Revised Form

A. For the characteristics of the mother, some institutions included this birth in calculating the number of prior children born alive to this mother. The marital status of mother in birth

certificate refers to legal status only. However, the information about marital status can be collected from mother's answer, whose reliability can not be estimated. The actual ages of the parents are sometimes different from the ages estimated from the birth date in their residence registration records.

B. The informations required on some items such as father's residence registration number, number of abortions, and the date of the last abortion can not be collected from some informants. The reliability of occupations of the parents can not be estimated.

C. Some informants refused to give informations required on the items of educational attainment and occupation of the parents. It is assumed that the refusal rate is relatively higher among the informants with low education and socioeconomic status.

2) Different Process of Completing the Records of Birth Certificates

A. The participating medical institutions had different recorders for of preparing and completing birth certificate. In the target institutions in Chungju and Chungwon area, the attending physician (in 1 institution), the attending nurse (in 3 institutions), the attending midwife (in 2 institutions), or admisniatrative personnel (in 1 institution) prepared and completed the revised birth certificate.

B. The birth certificate was usually completed right after

the mother left the institutions. The data necessary for preparation of the birth certificate were obtained from both the informants and medical records.

C. It took 10 or 15 minutes to complete the revised birth certificate form.

2. Evaluation of Collecting Birth Certificates

1) Collecting Procedures and Attitude of Field Personnel

Each participating institution in Chungju and Chungwon area was assigned to complete the revised birth certificate for the newborn delivered between June 1 and November 30, 1991. Every two weeks, a field manager from the community health center collected the birth certificates completed by each institution personnel, and checked any error or missing information in every item of the form. Every month research staff visited the community health center to collect the certificates filed by the field manager. The support of community health center was the key element in the system of data collection during the project period.

A. There was good cooperations between the field manager and the institution personnel, based on the frequent interactions between the community health center and the participating institutions' personnel.

B. For the community health center, it was not considered as

an additional burden to collect the birth certificates.

C. It is, therefore, highly recommended to organize the data collection system in which the community health center can play a primary role in establishing a medical birth registry system in Korea.

D. The service charge for issuing the revised birth certificate may be paid by the patient or government.

E. The data collected from the revised birth certificates can be analyzed by the KIHASA in order to develop some vital and health statistics, and to develop policy alternatives for planning, implementing, and evaluating the national and local health activities.

2) Use of Birth-related Data

The project was also designed to develop a scheme for using the information collected from the birth certificates. Following the scheme, the community health center can make list of the children whose birth occurred in the community in order to develop vital statistics for use in planning, evaluating, and administering local health activities, to complie health-realted statistics for use of the health department and other agencies and groups interested in fields of medical science, public health, demography, and social welfare, and to identify the target population of health service. During the period of the model study the study staff prepared the form of list of mothers and

children in Chungju area, and the forms for listing the mothers ans children requiring intensive or special cares. However, the data collected from birth certificates could not be used in planning, and evaluating community health activities during the period of the model study.

3. Evaluation of the Project by the Seminar

The seminar on use of the birth-related data was held in order to evaluate the findings of this study project, and develop some policy alternatives for using the birth-related data.

1) Papers Presented at the Meetings

Four papers were presented and discussed at the meeting. At the final session there was a comprehensive discussion on the model development of a medical birth registry system as a basic strategy for improving family health statistics in Korea. The items on the agenda were as follows.

① item 1: Usefulness of Data in the Standardized Birth Certificate of a Medical Birth Registry Project in Korea, presented by Kyung Seo, professor of obstetrics and gynecology, Yonsei University

② item 2: Findings form Model Development of a Medical Birth Registry System as a Basic Strategy for Improvement of Family Health Statistics in Korea, presented by Keywon

Cheong, research fellow, Korea Institute for Health and Social Affairs

③ item 3: Improvement of the Accuracy and Validity of the Standarized Birth Certificate Reporting Items, presented by Junghan Park, professor of preventive medicine, Kyungpook National University

④ item 4: Integration of Regional Health Information Network and Birth Certification System, presented by Young Moon Chae, professor of preventive medicine and public health, Yonsei University

⑤ item 5: Policy Implications of the Birth-related Data, chaired by Eung Suk Kim, senior fellow, Korea Institute for Health and Social Affairs

The summaries of the papers presented at the meeting are attached as Appendix D.

2) Participants to the Seminar

At the meeting 29 participants were involved in paper presentation and discussions. Those were:

- five participants from the Ministry of Health and Social Affairs,
- three participants from the related health and medical organization,
- three participants from universities,
- one participant from hospital,
- three participants from the target institutions of the model study,
- one participant from community health center,

- one participant from World Health Organization, and
- twelve participants from KIHASA.

3) Recommendations of the Seminar

① On Birth Certificate Form: The information required on some items in the revised birth certificate are hardly collected from informant or medical records. It is recommended to exclude the items of educational attainment of parents, occupation of parents, marital status of mother, experience of induced abortion of mother, and date of last abortion from the revised birth certificate form.

Of three copies of the revised birth certificate, the 'Copy B' can be submitted to medical insurance corperation.

② On Collection of the Birth-related Data: It is recommended to organize the birth reporting system, where the community health center performs the duty of collecting prompt and accurate birth certificates, and analyzing the data collected from the birth certificates. The service charge for completing and issuing the birth certificate may be paied by the patient or government, if possible.

③ On Use of the Birth-related Data: It is recommended to integrate the data from birth certificates and the data from medical insurance federation. The revised birth certification system can be well implemented with systematic cooperation among community health center, health-realted departments in

provincial office, the Ministry of Health and Social Affairs, National Statistical Office, Korea Institute for Health and Social Affairs, and Medical Insurance Federation.

4) Seminar Group's Suggestions for Follow-up Actions

① It is very important to develop the prompt and accurate vital statistics for use in planning, evaluating, and administerting national and local health activities, which can be achieved through implementation of the revised birth certification system.

② Before adopting the revised birth certification system, it is necessary to conduct the second-round, or higher-round if necessary, study to establish a nation-wide medical birth registry system in Korea.

③ It is recommended that the further model study, if conducted, should be designed and implemented by a consortium of government, health and medical organizations, universities, and research organizations.

④ Death registration and fetal death reporting systems are also integrated with birth certification system in the further model study.

⑤ Decision making on revising the current birth certification system should be based on the evaluation of the further study.

Chpater VI
SUMMARY AND CONCLUSIONS

1. Summary of the Study Project

Recently, the Supreme Court has revised the Family Registration Law, so that all birth registrations require a birth certificate signed by attending physicians, midwives, or others at delivery, starting from January 1st, 1991. This revision of the law was primarily intended to improve the identification of the parents of the newborn and the accuracy of the date of birth.

The medical and health information is very important in planning and eveluating health activities, but can not be collected through population censuses, vital registrations, or social surveys. This information comes from birth certification system only.

The primary objectives of this study were to assess the feasibility of collecting medical and health information on newborn and mother by establishing a medical birth registry system within the health service delivery system in Korea, and to develop a scheme to utilize the collected information for planning and evaluating the national and local health activitis. Thus the study project developed; (1) a new birth certificate form which contained some items related to the medical and

health information of the newborn and mother, (2) the system for collecting and analyzing the birth-related information in the revised form, and (3) a possible scheme for utilizing the medical and health informations in planning, evaluating, and administering state- and community-level health activities.

The project study had been conducted for six months between June 1, 1991 and November 30, 1991, in five target hospitals in Seoul and Taegu for institution-based study, and in 8 health and medical institutions in Chungju and Chungwon area for community-based study.

The major findings of the model study were as follows:

① Collecting System of Birth Certificate: When a birth occurs inside the target institutions, each institution personnel had completed three copies of the revised birth certificate within three days of the birth. The birth certificates completed by hospital or clinic personnel were collected by the personnel of the Health Center in the community.

② Collection of the Completed Birth Certificates: For 984 children, the revised birth certificates were collected from the institution-based study, and for 1,292 children from community-based study.

③ Accuracy of the Data: Of 984 birth certificates collected from the institution-based model study in Seoul and Taegu, the study staff queried 599 incomplete or inconsistent certificates (60.9%), and sent them back to the institution personnel. The

study staff collected and examined the corrected or recompleted birth certificates. However, some errors were still found in 158 birth cetificates (16.1%).

Of 1,292 birth certificates collected from the community-based model study in Chungju and Chungwon area 150 birth certificates (12.1%) were incomplete or inconsistent. And some errors were still found in 95 birth cetificates (7.4%) even after correction.

④ Tabulation of the Data: The data collected from the project were tabulated and presented in Appendix E.

⑤ Use of the Birth-related Data: The birth-related data collected from the revised birth certificate can be used in preparing national statistics of mother and child health, in planning, evaluating, and adminstering the mother and child health activities both at the national and local levels. The data can be used for research studies by the health department and other agencies and groups interested in the fields of medical science, public health, demography, and social welfare.

2. Conclusions

① A revised birth certificate is a basic data source in developing health statistics for use in planning and evaluating national and local health activities.

In Korea more than 90 per cents of the newborns were

dilevered inside an institution in 1991. It implies that the health and medical information of the newborns and the mothers can be provided by the birth certificates of more than 90 per cents of the newborns. The birth certificate is completed by the physician attending at the delivery, and whose statement, therefore, can be more accurate.

The information provided by the birth certification system can be useful for identifying risk factors which influence maternal and neonatal outcomes, and for estimating the incidence and prevalence of the high risk pregnancy. And the health and medical information provided by the birth certificate can be of use in assessing fetal distress, low Apgar score, other neonatal conditions which may possibly affect the development of long term neurologic sequels.

② The current form of birth certificate should be revised to have policy implications in health activities.

Beginning January 1991, the Korean government introduced the birth certification system by the revised Law of Family Registration, which states that each birth registration require a mandatory birth certificate completed by attending physicians, midwives, or others at delivery. The current certificate form, however, includes the limited information such as identification of parents, and place and time of the birth. and is of no use in developing more accurate vital statistics, or in planning health

policies.

While The current birth certificate form contains an open question for each item of 'physical status of the newborn' and of 'health status of the newborn', the item is usually filled up by the certifier, and completed simply as 'normal' or 'good'. Therefore, it has been advocated to revise the current birth certificate form to include more detailed informations about risk factors of pregnancy, delivery complications, and health status of newborn and contents of cares received during pregnancy and delivery.

③ It is recommended to delevelop and maintain a systematic program to improve the quality and usefulness of birth-realted data.

The medical and health information in the revised birth certificate can be useful in planning and evaluating the national and local health activities, when and only when the informations collected from the birth certificate are complete, consistent, accurate, and reliable. The findings of the study project suggest that the quality of informations in birth certificate can be improved through intensive education and training of personnel involved in birth certification system. Thus it is necessary to make a law and program to provide the overall responsibility and authority in birth certification system to birth-related institutions, physician, and informant.

3. Policy Recommendations

Some policy recommendations are presented, based on the findings of this study project towards the establishment of the medical birth registry system in Korea.

1) Need of Revising the Laws and Regulations Concerning Birth Certificate System

The revised Law of Family Registration states that each birth registration require a mandatory birth certificate completed by attending physicians, midwives, or others at delivery. The current certificate form is provided by the Medical Care Law. However, the current form is stipulated to include the limited information such as identification of parents, and place and time of the birth, and is of no use in planning health programs and policies. The current birth certificate form contains an open question for each item of 'physical condition of the newborn' and of 'health status of the newborn' without any definitions of each item. Therefore it is needed to standardize the variables to be reported in each of two items by revising the current birth certificate form as studied by this project.

2) Directions of Revising Birth Certificate

The primary objective to revise the current form of birth certificate should be in use of the informations collected from

the revised birth certificate in planning and evaluating national and local health activities. Thus the revised birth certificate should contain the items required in developing health statistics. The followings are the basic guidelines considered in revising the current birth certificate form.

① The revised form should be divided into two parts: one for birth report and registration; and the other for medical birth registry.

② The part for birth report should contain informations required for both the Vital Statistics and Family Registration Laws, and describe where and when the birth occurred only.

③ The part for the medical registry should be strictly confidential and used only for administrative and research purposes.

④ The part of the revised form should contain the items on mother's demographic and socio-economic status, mother's pregnancy history, prenatal care, risk factors related to this pregnancy, labor and delivery, and health status of newborn.

⑤ The revised form should contain the basic items for use in planning, evaluating, and administering health activities.

⑥ The information required to complete the revised form can be collected from the existing medical and obstetric records made for the care of mother and the newborn.

⑦ The definition of each variable in the revised form should be standardized and simplified.

3) The Revised Form of Birth Certificate (Proposal)

The following draft is suggested as one of the revising alternatives of the current birth certificate.

1. Upper Portion of the Birth Certificate (for birth reporting)
   (1) About the parents of the newborn
      A. Father
         ① Name
         ② Regidence registration number
         ③ Date of birth (if different from that in regidence registration records)
         ④ Occupation
      B. Mother
         ① Name
         ② Regidence registration number
         ③ Date of birth (if different from that in regidence registration records)
         ④ Occupation
   (2) Address of mother
   (3) About the newborn
      A. Place of birth
         ① Address
         ② Name of facility
      B. Date and time of birth
      C. Sex
   (4) Attendent
      A. Address
      B. Name and signature
   (5) Certifier
      A. License number
      B. Name and signature
2. Lower Portion of Birth Certificate (for medical and health study)
   (6) General characteristics of mother
      A. Education: less than junior high school,
         junior high school +

B. Mother-infant transfers

(7) Pregnancy history

A. Marital status

B. Plurality

① Plurality

② Birth ooder, if not single birth

③ Number of live births and fetal deaths, if not single birth

C. Live births

① Total number of live births

② Now living

③ Now dead

(8) Prenatal care

A. Prenatal care

① Prenatal care

② Month of pregnancy prenatal care began

③ Prenatal visits

B. Clinical estimate of gestation

C. Obstetric procedures

D. Risk factors for this pregnancy

(9) Labor and delivery

A. Method of delivery

B. Complications of labor and/or delivery

(10) Physical conditions of the newborn

A. Birth weight

B. Apgar scores

① 1 minute

② 5 minutes

C. Abnormal conditions

D. Congenital anomalies

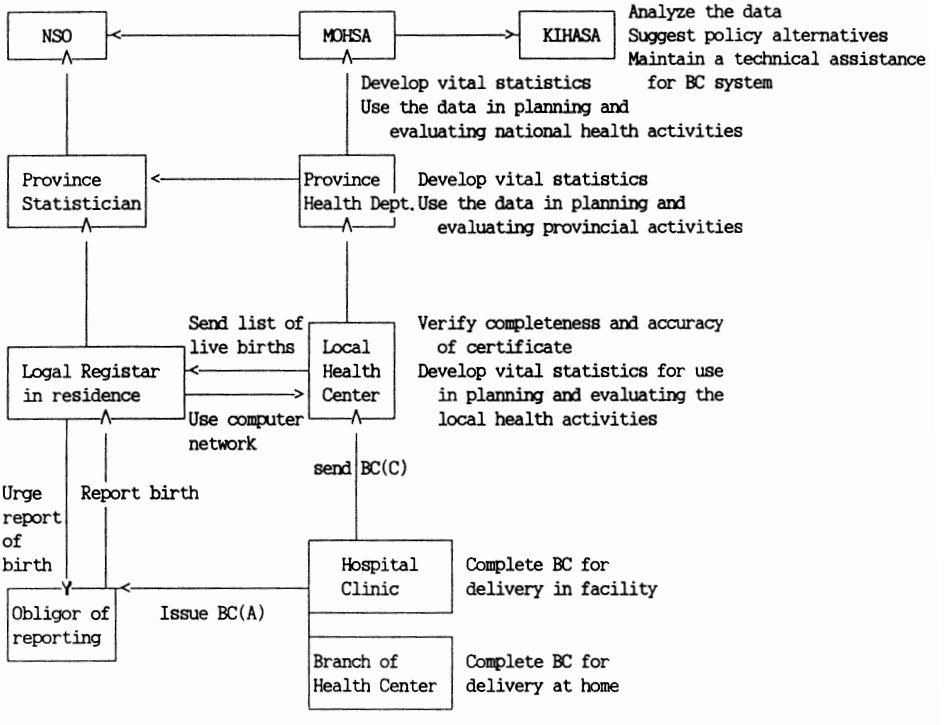
4) Reporting Procedure of the Revised Birth Certificate (Proposal)

When a birth occurs inside a health and medical facility, the responsiblity for completing the revised birth certificate rests on

the institution. When a birth occurs outside a hospital or clinic, and no physician is in attentance at the delivery, the responsibility for completing the revised birth certificate rests on the designated health personnel in mother's residence. However, the system of collecting the revised birth certificate depends to a very great extent on the supportive efforts of the community health center, health department of provincial office, and the Ministry of Health and Social Affairs. The proposed system of collecting birth certificate is presented in <Figure-7>.

① Hospital or Clinic: When a birth occurs inside a hospital or clinic, the hospital personnel should complete three copies of the revised birth certificate within three days of the birth. The institution personnel or midwife should:

- collect and record the information about the parents and the medical data required on the birth certificate. The medical information should be obtained from the obstetric and pediatric record.
- prepare a correct certificate, making certain that every item in certificate is completed.
- make the physician/midwife attending at the delivery review and ign the certificate.
- issue Copy A of the birth certificate to the parents of the newborn, who are responsible for reporting the birth to the



<Figure-4> System of Birth-related Data Collection

local registar office.
- maintain Copy B for institution's reference.
- send Copy C to Health Center of the community.

② Health Post: When a birth occurs outside a hospital or clinic and no physician is in attentance at the delivery, the public health personnel in health post should complete three copies of the revised birth certificate within three days of the birth. The health post personnel should:
- collect and record the information about the parents and the medical data required on the birth certificate.
- prepare a correct certificate, making certain that every item in certificate is completed.
- review and sign the completed certificate.
- issue Copy A of the birth certificate to the parents of the newborn, who are responsible for reporting the birth to the local registar office.
- maintain Copy B for institution's reference.
- send Copy C to Health Center of the community.

③ Community Health Center: The community health center has the overall responsiblity and authority to collect all the birth certificates for the infants born inside the community. The birth certificates completed by hospital or clinic personnel are collected by the personnel of the Health Center in the

community. The Health Center personnel should:

- collect Copy C of birth certificates prepared by the institution personnel.
- verify completeness and accuracy of the certificate.
- query incomplete or inconsistent certificates.
- if any errors are found, ask institution personnel to correct and complete the birth certificate again.
- if mother's residence is outside the community, send the completed birth certificate to the community health center in mother's residence.
- maintain files for the database of medical birth registry.
- develop vital and health statistics for use in planning, evaluating, and administering community health activities.
- send health-related statistics to provincial office.
- make list of mothers and children, and identify the target population requiring intensive cares.
- send list of the newborns to local registar office.

④ Department of Health in Provincial Office: The provincial office collects the birth-realted health statistics in the province, and compiles them for use in planning, evaluating, and administering health activities at provincial-level.

⑤ Ministry of Health and Social Affairs: The MOHSA collects the birth-related statistics from each province, and compiles

them for use in planning, evaluating, and administering the national health policies. The MOHSA also prepares and publishes the national report on statistics of births, after tabulation of the data available in the revised birth certificates.

⑥ Korea Institute for Health and Social Affairs: The KIHASA is responsible to:

- conduct health and social-research studies based on the data collected from the revised birth certificates.
- maintain and develop a technical assistance program to improve the quality and usefulness of health-related statistics.

5) Implementation of the Second-round Study (Proposal)

It is highly recommended to design and implement the second-round study on the proposed birth certification system, in a provincial level. The primary objectives of the second-round study should be on identifying the problems and assessing impacts of the porposed system, applying the experiences and lessons learned in this feasibility study done in 1991-1992.

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APPENDICES

APPENDIX A

REVISED BIRTH CERTIFICATE (in Korean)

출 생 증 명 서

1	출생아의 부 모	부	성명		연령	년 월 일생(만 세)			
			주민등록번호		본적		직업		
		모	성명		연령	년 월 일생(만 세)			
			주민등록번호		본적		직업		
2	산모의 주소	시 구 동 번지 도 시(군) 동(읍,면) 리 번지							
3	출생 장소	주소	시 구 동 번지 도 시(군) 동(읍,면) 리 . 번지						
		구분	① 자가 ② 의원 ③ 병원 ④ 모자보건센타 ⑤ 조산소 ⑥ 기타 *② - ⑤의 경우, 기관명칭 : ( )						
4	출생일시	199 년 월 일 시 분		출생아	성별	남 여 불상			
5	임신월수	( )개월			성명				
6	다태	① 쌍태 ② 삼태 ③ ___태	다태출산중의 본아의 출산순위	① 제1아 ② 제2아 ③ 제3아 ④ 제4아					
			다태출산중의 태아의 상태	출생 ___인(남___인, 여___인) 사산_____태(남___태, 여___태, 불상___태)					
7	산모의 산아수	_____명중:생존자_____명, 사망자_____명, 사산자_____태							
8	출생아의 신체상황								
9	출생아의 건강상황								

위와 같이 증명함.

199 년 월 일

주 소

의료기관명칭

면 허 번 호 의사성명 인

(비) (병)

10. 산모 및 출생아의 건강상태에 관한 사항

가. 일 반 사 항

① 산모의 교육수준 ____년

② 타기관으로부터의 의뢰여부
☐ 예
☐ 아니오

나. 임 신 및 출 산 력

③ 산모의 혼인 상태
☐ 기 혼
☐ 미 혼

④ 유산 경험 여부
자연유산: 회
인공유산: 회
최종유(사)산:19 년 월

⑤ 최종출생년월
19 년 월

다. 산 전 관 리

⑥ 산전진찰
☐있음 ☐없음
→첫 진찰시기:임신 주
→회 수:총 회

⑦ 분만시 임신주수: 주

⑧ 산과적 검사 및 처치
(*해당되는 사항 전부 표시)
☐ 01 양수검사
☐ 02 태아전자감시진단
☐ 03 초음파검사
☐ 04 유도분만
☐ 05 분만촉진
☐ 06 진통해소
☐ 07 그외:_____
☐ 00없음

⑨ 임신과 관련된 위험요인
(*해당되는 사항 전부 표시)
☐ 01 빈혈(Hct<30/Hgb<10)
☐ 02 심장질환
☐ 03 급성 또는 만성폐질환
☐ 04 당뇨병
☐ 05 만성고혈압
☐ 06 임신중독성 고혈압
☐ 07 신장질환
☐ 08 자간증
☐ 09 음부포진
☐ 10 자궁출혈
☐ 11 자궁경부 무력증
☐ 12 양수과다/양수과소증
☐ 13 Rh감작
☐ 14 조산아 및 저체중아 출산경험(2500gm이하)
☐ 15 과체중아 출산경험 (4000gm이상)
☐ 16 그외:_____
☐ 00 없음

라. 분만 및 출산

⑩ 분만방법
(*해당되는 사항 전부 표시)
☐ 01 질식분만(자연)
☐ 02 감자분만
☐ 03 흡인분만
☐ 04 제왕절개분만경험후 질식분만
☐ 05 1차제왕절개수술
☐ 06 2차이상의 제왕절개수술

⑪ 분만 및 출산시의 합병증
(*해당되는 사항 전부 표시)
☐ 01 조기파수(12시간 이상)
☐ 02 진통이상
☐ 03 아두골반불균형
☐ 04 둔위 및 기타 이상태위
☐ 05 전치태반
☐ 06 태반 조기박리
☐ 07 과다출혈
☐ 08 태변
☐ 09 태아 가사
☐ 10 조기분만(3시간 이내)
☐ 11 지연분만(20시간 이후)
☐ 12 제대탈출
☐ 13 진통시 자간
☐ 14 열(38℃ 이상)
☐ 15 마취합병증
☐ 16 그외:_____
☐ 00 없음

마. 출생아의 건강상태

⑫ 출생아의 체중
gm

⑬ 아프가수치
1분 : _____
5분 : _____

⑭ 출생아의 이상
(*해당사항 전부 표시)
☐ 01 빈혈(Hct<39/Hgb<13)
☐ 02 분만시손상
☐ 03 태아알콜증
☐ 04 신생아 호흡곤란증 초자막 질환
☐ 05 태변흡입폐렴증후군
☐ 06 호흡조력(30분이내)
☐ 07 호흡조력(30분이후)
☐ 08 경기
☐ 09 그외:_____
☐ 00 없음

⑮ 출생아의 선천성 기형(*해당되는 사항 전부 표시)
☐ 01 무뇌아
☐ 02 척추파열
☐ 03 뇌수종
☐ 04 소뇌
☐ 05 기타중추신경계의 이상 :_____
☐ 06 심장기형
☐ 07 기타순환 및 호흡계기형 :_____
☐ 08 직장(항문)폐쇄
☐ 09 기관식도루(관)
☐ 10 제대 헤르니아
☐ 11 기타위장계 기형 :_____
☐ 12 생식기 기형
☐ 13 무신증 기형
☐ 14 기타비뇨생식계 기형 :_____
☐ 15 토순
☐ 16 단지, 다지, 무지
☐ 17 만곡족
☐ 18 횡경막헤르니아
☐ 19 기타근골격계기형 :_____
☐ 20 다운증후군
☐ 21 기타염색체이상 :_____
☐ 22 그외:_____
☐ 00 없음

(보사연 제출용)

APPENDIX B

REVISED BIRTH CERTIFICATE (in English)

BIRTH CERTIFICATE

1	ABOUT FATHER AND MOTHER OF THE NEWBORN	FATHER	Name		Birth Date	Year: Month: Day: (Age:)		
			RR Number		Family Address		Occupation	
		MOTHER	Name		Birth Date	Year: Month: Day: (Age:)		
			RR Number		Family Address		Occupation	
2	ADDRESS OF MOTHER	City or Province District (City, County) Dong (Eup, Myun) Ri St. #						
3	PLACE OF BIRTH	ADDRESS	City or Province District (City, County) Dong (Eup, Myun) Ri St. #					
		FACILITY	①Home ②Clinic ③Hospital ④MCH Center ⑤Midwife Post ⑥Others (* Name of Facility, if checked ②-⑤:)					
4	DATE OF BIRTH	Year: Month: Day: Time:		CHILD	Sex	①Male ②Female ③Unknown		
5	GESTATION MONTHS	_____ Months			Name			
6	PLURALITY	①Single ②Twin ③(if more than twin, specify: _____)	Birth Order	①Born 1st. ②Born 2nd. ③Born 3rd. ④Born 4th.				
			Status of Delivery	# of Live Births: Male_____ Female_____ # of Fetal Deaths: Male____ Female____ Unknown_____				
7	NUMBER OF BIRTHS	Of ____ Live Births: # of Now Living_____ # of Now Dead_____ # of Fetal Deaths_____						
8	PHYSICAL CONDITION OF CHILD							
9	HEALTH STATUS OF CHILD							

I do hereby certify that the above particulars are correct.

Date:

Mailing Address:

Name of Facility:

Number of License: Name and Signature:

10. HEALTH AND MEDICAL INFORMATIONS OF MOTHER AND CHILD

A. General Information

① Mother's Education

_____years

② Mother Transferred before Delivery?

☐ Yes
☐ No

B. Pregnancy History

③ Marital Status of Mother

☐ Married
☐ Not-married

④ Abortions

# of Spontaneous Abortions: _____
# of Induced Abortions: _____
Date of Last Abortion: Year___ Month_____

⑤ Date of Last Live Birth

Year___ Month____

C. Prenatal Pregnancy Care

⑥ Prenatal Care

Received prenatal pregnancy care?
☐ Yes ☐ No
(if yes)
Week of care began: _____ weeks
Total number of visits: _____

⑦ Estimate of Gestation

Weeks

⑧ Obstetric Procedures
(Check all that apply)

☐ 01 Amniocentesis
☐ 02 Electronic fetal monitoring
☐ 03 Ultrasound
☐ 04 Induction of labor
☐ 05 Stimulation of labor
☐ 06 Tocolysis
☐ 07 Other:_____
☐ 00 None

⑨ Risk Factors for Pregnancy
(Check all that apply)

☐ 01 Anemia (Hct. <30 / Hgb. <10)
☐ 02 Cardiac disease
☐ 03 Acute or chronic lung disease
☐ 04 Diabetes
☐ 05 Hypertension, chronic
☐ 06 Hypertension, pregnancy-associated
☐ 07 Renal disease
☐ 08 Eclampsia
☐ 09 Genital herpes
☐ 10 Uterine bleeding
☐ 11 Incompetent cervix
☐ 12 Hydramnios/ Oligohydramnios
☐ 13 Rh sensitization
☐ 14 Previous preterm or small-for-gestational-age infant
☐ 15 Previous infant 4000+ grams
☐ 16 Other:_____
☐ 00 None

D. Labor and Delivery

⑩ Method of Delivery
(Check all that apply)

☐ 01 Vaginal
☐ 02 Forceps
☐ 03 Vacuum extraction
☐ 04 Vaginal birth after previous C-Section
☐ 05 Primary C-Section
☐ 06 Repeat C-Section

①① Complications of Labor and/or Delivery
(Check all that apply)

☐ 01 Premature rupture of membrane
☐ 02 Dysfunctional labor
☐ 03 Cephalopelvic disproportion
☐ 04 Breech /malpresentation
☐ 05 Placenta previa
☐ 06 Abruptio placenta
☐ 07 Excessive bleeding
☐ 08 Meconium
☐ 09 Fetal distress
☐ 10 Precipitous labor (<3 hours)
☐ 11 Prolonged labor (>20 hours)
☐ 12 Cord prolapse
☐ 13 Seizures during labor
☐ 14 Febrile (> 100°F or 38°C)
☐ 15 Anesthetic complications
☐ 16 Other:_____
☐ 00 None

①⑤ Congenital Anomalies of Child
(Check all that apply)

☐ 01 Anencephalus
☐ 02 Spina bifida/Meningocele
☐ 03 Hydrocephalus
☐ 04 Microcephalus
☐ 05 Other central nervous system anomalies
Specify:_____

E. Health Status of Child

①② Birth Weight

Grams

①③ Apgar Score

1 Minute: _____
5 Minutes: _____

①④ Abnormal Conditions of the Newborn
(Check all that apply)

☐ 01 Anemia (Hct.<39 / Hgb. <13)
☐ 02 Birth injury
☐ 03 Fetal alcohol syndrome
☐ 04 Hyaline membrane disease/ RDS
☐ 05 Meconium aspiration syndrome
☐ 06 Assisted ventilation <30 min.
☐ 07 Assisted ventilation >30 min.
☐ 08 Seizures
☐ 09 Other:_____
☐ 00 None

☐ 06 Heart malformations
☐ 07 Other circulatory/ respiratory anomalies
Specify:_____
☐ 08 Rectal atresia/ stenosis
☐ 09 Tracheo-esophageal fistula/ esophageal atresia
☐ 10 Omphalocele/ Gastroschisis
☐ 11 Other gastrointestinal anomalies
Specify:_____
☐ 12 Malformed genitalia
☐ 13 Renal agenesis
☐ 14 Other urogenital anomalies
Specify:_____
☐ 15 Cleft lip/ palate
☐ 16 Polydactyly/ Syndactyly/ Adactyly
☐ 17 Club foot
☐ 18 Diaphragmatic hernia
☐ 19 Other musculoskeletal/ integumental anomalies
Specify:_____
☐ 20 Down's syndrome
☐ 21 Other chromosomal anomalies
Specify:_____
☐ 22 Other:_____
☐ 00 None

Appendix C

Hospitals' and Physicians' Handbook on Completing the Revised Birth Certificate

1991

Korea Institute for Health and Social Affairs

Contents

I. Introduction

1. Summary of the Study

Recently, the Supreme Court has revised the Family Registration Law, so that all birth registrations require a birth certificate signed by attending physicians, midwives, or others at delivery, starting from January 1st, 1991. The revision of the law provides birth certification system in Korea, whose primary aim is to improve the accuracy of birth allocation by birth date. The birth certificate includes the information on father and mother of the newborn, on the newborn, and pregnancy and fertility history of the mother. However, even in this revision, the certificate form does not include the medical and health information necessary for risk assessment of the newborn and the mother.

The medical and health information is very important in planning and eveluating health activities, but cannot be collected through population censuses, vital registrations, or social surveys. This information comes from birth certification system only.

The primary objectives of this study are to assess the feasibility of collecting medical and health information on newborn and mother through medical birth registry system in Korea, and to develop a scheme to utilize the collected information for planning and evaluating the national and local health activitis. The aims of this study are: (1) to develop a new birth certificate form, which includes some items on medical and health information of the newborn and mother; (2) to develop a system for collecting and analyzing the birth-related information; and (3) to develop a scheme for utilizing the medical and health information provided by birth certification system in planning, evaluating, and administering national and local health activities.

2. Importance of Birth Certification System

When a birth occurs, the person responsible for registering the birth should report the event of birth with the birth certificate within three weeks of the birth (Article 49 of the Family Registration Law). The birth certificate filed with birth report is very important in terms of the followings as:

① A birth certificate is a permanent legal record.

A birth report and birth certificate are the statements of facts concerning an individual. They are permanent legal records, proving the age and parentage of an individual. They are needed for entrance to school; voter registration; obtaining a driver's license, marriage license, or social security benefits; and many other purposes. In Korea, the statement in the birth report and birth certificate is a reference to family registration and resident registration, which is needed for the purposes described above.

② The data provided by birth registration and birth certification are basic resources of vital statistics.

The vital statistics based on birth registration system are the basic sources in measuring fertility, mortality, and population growth, which provide the projection of future population.

③ The data provided by birth registration and birth certification are of use in planning, evaluating and admistering health policies.

In Korea the birth certificate is of use in proving the age and parentage of an individual only. In other countries, especially in the developed countries, the health and medical information collected through birth certificate is of use in developing vital statistics, and in planning, evaluating and administering the national and local health activities.

3. Revised Birth Certificate

The study staff decided the revised birth certificate be composed of three copies of form. The first copy (Copy A), designed to be issued to parents of the newborn and be attached to birth report form in reporting a birth, was the same as the current certificate, and contained item 1 through 9 only. The second copy (Copy B), designed to be collected by the study staff, contained the duplicated items 1 through 9 of the first copy and new item 10. The third copy (Copy C), designed to be filed in reporting institutions, was the same as the second copy including health and medical information.

The items contained in the revised birth certificate are as follows:

① Copy A (for birth registration)

1. About the Parents:
   Name, age, occupation, origin place, date of birth, and residence registration number
2. Mother's Residence
3. About Place of the Birth
4. Date and Time of the Birth
5. Clinical Estimate of Gestation (in Months)

6-1. Name and Sex of Child

6-2. Plurality

6-3. Order of Birth (in case of plurality)

6-4. Still-births or not for each birth (including sex)

7. Pregnancy History
   Numbers of Live Births, Now Living, and Now Dead
   Number of Previous Still-Births
8. Physical Condition of the Newborn
9. Health Status of Newborn at Delivery

Certifier:
   date signed
   address of the certifier

name of institution
license number (doctor or midwife)
Signature of certifier

② Copy B and Copy C (for filing in the institution and sending to KIHASA)

1-9. same as items 1 through 9 in Copy A

10. Items on Health Status of the Newborn and the Mother
:a) general information, b) fertility and pregnancy history, c) prenatal care, d) method of delivery, and e) health conditions of the newborn

4. Purpose of Handbook

This handbook is designed as an aid to acquaint physicians, hospital personnel, and others with the birth certification system, and to provide instructions for completing the revised birth certificates used during the period of the study project. It includes specific instructions for recording entries.

II. Instructions for Completing the Revised Birth Certificate

1. Grneral Instructions

1) When a delivery results in a live birth, a birth certificate must be completed, even if the infant lives for only a very short period of time. A live birth is defined as the complete expulsion or extraction from its mother of a product of human conception, irrespective of the duration of pregnancy, which, after such expulsion or extraction, breathes or shows any other evidence of life, such as beating of the heart, pulsation of the umbilical cord, or definite movement of voluntary muscles.

2) When a live birth occurs outside a medical institution and is

attended by a physician, midwife, or nurse, at the delivery, the physician, midwife or nurse must complete a birth certificate.

3) The data necessary for preparation of the birth certificate should be obtained right after the delivery.

4) The revised birth certificate is composed of three copies of form. The first copy (Copy A), designed to be issued to parents of the newborn and be attached to birth report form in reporting a birth, is the same as the current certificate, and contains item 1 through 9 only. The third copy (Copy C), designed to be collected by the study staff, contains the duplicated items 1 through 9 of the first copy and new item 10. The second copy (Copy B), designed to be filed in reporting institutions, is the same as the third copy including health and medical information.

5) Confidentiality of information on the birth certificate must be assured. Informations on the birth certificates are available only to persons involving in the study project.

6) The birth certificate must be legibly printed in permanent black ink, with Korean or Chinese characters, and checked by 'v' in "□ that applies.

7) The physician attending at or immediately after the delivery should make certain that every item in the birth certificate is completed correctly and consistently.

2. Completing the Revised Birth Certificate

A. Copy A (for birth reporting)

The first copy (Copy A) is designed to be issued to parents of the newborn and be attached to birth report form in reporting a birth, and contains information required for identification of the individual and a description of where and when the birth occurred.

1) Father and Mother of the Newborn

These items are used for identification and characteristics of

parentage. Each item should be completed for father and mother.

(Name): Write the current legal names, which should be same as the names in family registration records. If the child was conceived and born out of wedlock to a divorced, widowed, or never-married mother, write 'unknown' for father's name.

(Age and date of birth) Enter the exact day, month, and year that the father and mother were born. The ages of father and mother can be calculated from the date of birth.

(Residence registration number): Enter residence registration number of father and mother.

(Permanent address): Enter the permanent address of father and mother. When the child was conceived to a foreign mother, or the father was a foreigner, enter the nationality of father or mother.

(Occupation): Specify the type of occupation.
Example - accountant at a telephone manufcturing company

2) Mother's Residence

The mother's residence is the address where her household is located. Residence for a short time at home of a relative or friend for the purpose of awaiting the birth of the child is considered temporary, and should not be entered here.

3) Place of Birth

(Address): Enter the address or location where the birth occurred. For births occurring on a moving conveyance, enter the address where the child was first removed from the convayance.

(Facility): ① Residence ② Clinic ③ Hospital ④ MCH center
⑤ Midwife post ⑥ Other (Specify:)

Check the place where the birth occurred. This item identifies home births, births in nonhospital clinics, and births in hospital. This information can be used for analyzing the number and characteristics of births by type of facility. This is also helpful in determining the level of utilization and characteristics of births occurring in each type of facilities.

4) Date and Time of Birth, Sex, and Name

(Date and time of birth): Enter the exact year, month, day, and time (hour and minute) the child was born. Be sure to indicate whether the time of birth is a.m. or p.m. This item is used to estabilsh age for such purposes as school entrance, residence registration, and social security benefits etc. This item can be also used to identify the order of birth in plural deliveries.

When the birth occurs around midnight, the exact hour and minute may affect the date of birth. For births occurring at the end of the year, the hour and minute affect not only the day but the year of birth.

(Sex): Check male or female.

(Name): Enter the full name of the child exactly as given by parents. If the parents do not have a given name prepared for the child, do not leave the item blank, but enter mother's name and order of birth. (example - 1st. baby of X X Kim)

5) Estimate of Gestation (Months)

Enter the length of gestation as computed from the date last normal menses began and date of birth, or as estimated by the attendant.

6) Plurality

If this is a single birth, leave the item blank. When a plural delivery occurs, specify the birth as 1) twin, 2) triplet, or 3) quadruplet etc. For the plural delivery, prepare and complete a separate birth certificate for each child.

When a plural delivery occurs, specify number of live births and fetal deaths, and sex of each birth. (example - two live births (1 male; 1 female); two fetal deaths (1 male; 1 female))

7) Pregnancy History

(Number of live births): Enter the number of prior children born alive to this mother. Do not include this child. Do not include children by adoption. Enter "0" if this is the first live birth to this mother.

(Now living): Enter the number of prior children born alive to this mother who are still living at the time of this birth. Do not include this child. Do not include children by adoption. Enter "0" if this is the first live birth to this mother or if all previous children are dead.

(Now dead): Enter the number of prior children born alive to this mother who are no longer living. Do not include this child or any children by adoption. Enter "0" if this is the first live birth to this mother or if all previous children are still living.

(Number of fetal deaths): Enter number of prior fetal deaths occurring to this mother.

8) Physical Conditions of the Newborn

Enter the weight in grams and height in centimeters of the child.

9) Health Status of the Newborn

Specify health status of the child as it is recorded in the physician's record.

B. Copy B and Copy C (for health and medical information)

The third copy (Copy C), designed to be collected by the study staff, contains the duplicated items 1 through 9 of the first copy and new item 10. The second copy (Copy B), designed to be filed in reporting institutions, was the same as the third copy including health and medical information. Following items are added in Copy B and Copy C.

1-9. same as items 1 through 9 in Copy A

10. Items on Health Status of the Newborn and the Mother

a) general information (2 items): ① educational attainment of mother ② mother-child trasfers

b) pregnancy history and fertility (3 items): ③ marital status ④ abortion ⑤ date of last live birth

c) prenatal care (4 items): ⑥ prenatal pregnancy care ⑦ estimates of gestation ⑧ obstetric procedures ⑨ risk factors for pregnancy

d) labor and delivery (2 items): ⑩ method of delivery ⑪ complications of labor and delivery

e) physical conditions of the child (4 itms): ⑫ birth weight ⑬ Apgar scores ⑭ abnormal conditions ⑮ congenital anomalies

① Educational Attainment of Mother

Enter the highest number of years of formal schooling completed by the mother.

Examples - 1) 12 years if the mother graduated senior high school.
2) 10 years if the mother completed the first grade of senior high school.

② Mother Transfers

Check "No" if this is the first facility the mother was admitted to for delivery. Check "Yes" if the mother was transferred from one facility to this facility before the child was delivered.

③ Marital Status of Mother

Check "Married" if the mother was legally married at the time of conception, at the time of birth, or at any time between conception and birth. Otherwise, check "Unmarried." A woman is legally married even if she is separated.

④ Abortions

Enter the number of fetuses that were delivered dead, by spontaneous or induced abortion, regardless of the length of gestation. Do not leave this items blank, but enter "0" or "None" if this is the first pregnancy for this mother or if app previous pregnancies resulted in live-born infants.

Enter the date (month and year) of the last abortion of pregnancy. If the mother has never had an abortion, enter "-," "Not applicable," or "None." Do not leave this item blank.

⑤ Date of Last Live Birth

Enter the date (month and year) of birth of the last live-born child of the mother. If this certificate is for the second birth of a twin set, enter the date of birth for the first baby of the set, if it was born alive. Similarly, for triplets or other multiple births, enter the date of birth of the previous live birth of the set. Enter "0" if the mother has not had a previous live birth. Do not leave this item blank.

⑥ Prenatal Pregnancy Care

Check "Yes" if the mother had received any prenatal care from a physician or other health prefessional or attended a prenatal clinic.

If no prenatal care was received, check "No."

If the mother received any prenatal care, enter the number of month in this pregnancy when she received the first care during her pregnancy, and enter the number of visits made for medical supervision of the pregnancy by a physician or other health care provider during the pregnancy. If no prenatal care was received, enter "None," or "-" for this item. Do not leave the item blank.

⑦ **Clinical Estimate of Gestation (Weeks)**

Enter the length of gestation as estimated by the attendant, or as computed from the date last normal menses began and date of birth.

⑧ **Obstetric Procedures** (Check all that apply)

- ☐ 01 Amniocentesis
- ☐ 02 Electronic fetal monitoring
- ☐ 03 Ultrasound
- ☐ 04 Induction of labor
- ☐ 05 Stimulation of labor
- ☐ 06 Tocolysis
- ☐ 07 Other:_
- ☐ 00 None

Check each type of procedure that was used during this pregnancy. More than one procedure may be checked. If a procedure was used that is not identified in the list, check "Other" and specify the procedure on the line provided. If no procedures were used, check "None." Do not leave this item blank.

⑨ **Risk Factors for this Pregnancy** (Check all that apply)

- ☐ 01 Anemia (Hct. <30 / Hgb. <10)
- ☐ 02 Cardiac disease
- ☐ 03 Acute or chronic lung disease
- ☐ 04 Diabetes

☐ 05 Hypertension, chronic
☐ 06 Hypertension, pregnancy-associated
☐ 07 Renal disease
☐ 08 Eclampsia
☐ 09 Genital herpes
☐ 10 Uterine bleeding
☐ 11 Incompetent cervix
☐ 12 Hydramnios/ Oligohydramnios
☐ 13 Rh sensitization
☐ 14 Previous preterm or small-for-gestational-age infant
☐ 15 Previous infant 4000+ grams
☐ 16 Other:
☐ 00 None

Check each of the medical risk factors that the mother experienced during this pregnancy. If the mother experienced medical risk factor(s) not identified in the list, check "Other" and enter the risk factor on the line prvided. If there were no medical risk factors, check "None," and do not leave this item blank.

⑩ Method of Delivery (Check all that apply)
☐ 01 Vaginal
☐ 02 Forceps
☐ 03 Vacuum extraction
☐ 04 Vaginal birth after previous C-Section
☐ 05 Primary C-Section
☐ 06 Repeat C-Section

Check the method of delivery of the child. If more than one method was used, check all methods that apply to this delivery. Do not leave this item blank. If "Vaginal birth after previous C-section" is check, one of "Vaginal," "Forceps," or "Vacuum" should be checked.

⑪ **Complications of Labor and/or Delivery** (Check all that apply)

- ☐ 01 Premature rupture of membrane (>12 hours)
- ☐ 02 Dysfunctional labor
- ☐ 03 Cephalopelvic disproportion
- ☐ 04 Breech /malpresentation
- ☐ 05 Placenta previa
- ☐ 06 Abruptio placenta
- ☐ 07 Excessive bleeding
- ☐ 08 Meconium
- ☐ 09 Fetal distress
- ☐ 10 Precipitous labor (<3 hours)
- ☐ 11 Prolonged labor (>20 hours)
- ☐ 12 Cord prolapse
- ☐ 13 Seizures during labor
- ☐ 14 Febrile (> 100°F or 38℃)
- ☐ 15 Anesthetic complications
- ☐ 16 Other:
- ☐ 00 None

Check each medical complication present during this labor and/or delivery. If a complication was present that is not identified in the list, check "Other" and specify the complication on the line provided. If there was no complications, check "No," and do not leave this item blank.

⑫ **Birth Weight**

Enter the birth weight of the child as it is recorded in the hospital record. Enter the weight in grams, not in kilograms.

⑬ **Apgar Score**

Enter the Apgar scores (0 through 10) as assigned by the delivery room personnel, 1 minute and 5 minutes after birth. The Apgar score is regarded as a reliable summary measure for evaluating the physical

condition of the infant at birth. Refer to the following table to determine the method of Apgar scoring.

Method of Apgar Scoring

	Score		
Sign	0	1	2
Heart rate	Absent	Slow (< 100)	100+
Respiratory effort	Absent	Weak cry	Strong cry
Muscle tone	Limp	Some flexion	Well flexed
Reflex irritability	No	Some motion	Cry
Color	Blue, pale	Body pink	Completely pink

⑭ **Abnormal Conditions of the Newborn** (Check all that apply)

- ☐ 01 Anemia (Hct.<39 / Hgb. <13)
- ☐ 02 Birth injury
- ☐ 03 Fetal alcohol syndrome
- ☐ 04 Hyaline membrane disease/ RDS
- ☐ 05 Meconium aspiration syndrome
- ☐ 06 Assisted ventilation <30 min.
- ☐ 07 Assisted ventilation >30 min.
- ☐ 08 Seizures
- ☐ 09 Other:_
- ☐ 00 None

Information on abnormal conditions of the newborn is used to measure the extent infants experience medical problems. Check each abnormal condition associated with the newborn infant. If more than one abnormal condition exists, check each condition. If an abnormal condition is present that is not identified in the list, check "Other" and specify it.

⑮ **Congenital Anomalies of Child** (Check all that apply)

- ☐ 01 Anencephalus
- ☐ 02 Spina bifida/Meningocele
- ☐ 03 Hydrocephalus
- ☐ 04 Microcephalus
- ☐ 05 Other central nervous system anomalies
  Specify:
- ☐ 06 Heart malformations
- ☐ 07 Other circulatory/ respiratory anomalies
  Specify:
- ☐ 08 Rectal atresia/ stenosis
- ☐ 09 Tracheo-esophageal fistula/ esophageal atresia
- ☐ 10 Omphalocele/ Gastroschisis
- ☐ 11 Other gastrointestinal anomalies
  Specify:
- ☐ 12 Malformed genitalia
- ☐ 13 Renal agenesis
- ☐ 14 Other urogenital anomalies
  Specify:
- ☐ 15 Cleft lip/ palate
- ☐ 16 Polydactyly/ Syndactyly/ Adactyly
- ☐ 17 Club foot
- ☐ 18 Diaphragmatic hernia
- ☐ 19 Other musculoskeletal/ integumental anomalies
  Specify:
- ☐ 20 Down's syndrome
- ☐ 21 Other chromosomal anomalies
  Specify:
- ☐ 22 Other:
- ☐ 00 None

Information on congenital anomalies is used to identify health problems that require medical care, and to monitor the incidence of

the stated conditions.

Check each anomaly of the child. The checklist of anomalies is grouped according to major body systems. If an anomaly is present that is not identified in the list, check "Other" and specify it. The information required on this checklist can be obtained from the mother's and infant's medical records.

Appendix D

Summary of Papers Presented at the Seminar

Usefulness of Data in the Standardized Birth Certificate of a Medical Birth Registry Project in Korea

Kyung Seo, M.D., M.P.H.
Department of Obstetrics and Gynecology
Yonsei University Medical Center

The Korea Institute for Health and Social Affairs(KIHASA), under the technical and financial support of WHO, has implemented a medical birth registry project since June 1991 in order to test a feasibility of the use of a standardized birth certificate after revising the current form of birth certificate.

This paper is to explain the public health reasons for a revision of the current birth certificate and to present an usefulness of the data collected by the KIHASA's standardized birth certificate in deriving various MCH indicators useful for planning and evaluating MCH services and for conducting service research in MCH.

Maternal and child health(MCH) service is an important health service not only as a service for pregnant women and newborns but also as a basic health service which will possibly determine the quality of future population. Health information systems for MCH service usually includes (1) risk factors affecting pregnancy, (2) health status of mother, newborn, children and adolescents, (3) utilization of maternity care, newborn care, child health care services.

Traditionally the mortality rates had been the main health status indicators. However, recently, the infant mortality rate and maternal mortality rate have been dropped so fast that those rates are no longer sensitive enough to reflect the changes of maternal & child health status in Korea.

Thus, for MCH, the morbidity and impairment rates have increasingly become important health indicators. For example, pregnancy complications and fetal morbidities are not only sensitive indicators but also the predictors of the future complications such as neurologic sequels, organ failures, subtle behavioral and intellectual abnormalities.

Also, each MCH service utilization indicator has become an important and sensitive indicator. For example, antenatal care rate and institutional delivery rate improved markedly as the medical insurance covers the whole population in Korea. But the content and

quality of antenatal care are not standardized yet, partly because the medical insurance does not cover antenatal care. Quality of the neonatal care including its intensive care is often not adequate under current health insurance payment scheme which only compensate a few selected services at minimal price. Thus, the detailed informations about the content and quality of each care in MCH services are in need to evaluate their adequacy and effectiveness of service utilization.

Beginning January 1991, the Korean government has revised the law of civil registration, so that each birth registration require mandatory a birth certificate signed by attending physicians, midwives, or others at delivery. In the current certificate form, however it includes the limited informations such as identification of parents and place and time of birth. While it provides an open space for each item of 'physical status of newborn' and for 'health status of newborn', it is usually filled up by the certifier, recording simply as 'normal' or 'good'. Therefore, it has been advocated to revise the current birth certificate form to include more detailed informations about risk factors of pregnancy, delivery complications, and health status of newborn and contents of cares received during pregnancy and delivery.

We welcome a timely effort of the KIHASA to test a feasibility of the use of its revised birth certificate which includes the standardized items on such health information of mother and new-born at birth. The author believes that the KIHASA's standardized birth certificate will eventually provide not only the important informations for planning and evaluation of MCH services but also the basic information useful for conducting many service researches in MCH as mentioned below;

1. Monitoring the births of congenital anomalies and studying their risk factors.
2. Monitoring the births of low-birth-weight, studying their risk factors, and analyzing preventive service and management of newborn.
3. Assessing fetal distress, low Apgar score, other neonatal conditions which will possibly affect the development of long term neurologic sequels.
4. Identifying risk factors which influence maternal and neonatal outcomes and for estimating the incidence and prevalence of the high risk pregnancy.
5. Analyzing a pattern of patient referral which will provide an useful informations for developing an effective patient referral

system.
6. Monitoring the increasing trend of Cesarean section and analyzing its cause.
7. Studying the effectiveness and efficiency of the various diagnostic tests and procedures during pregnancy and delivery.

"Model Development of a Medical Birth Registry System as a Basic Strategy for Improvement of Family Health Statistics in Korea"

Keywon Cheong, Ph.D
Korea Institute for Health and Social Affairs

1. Introduction

The study entitled "Model Development of a Medical Birth Registry System as a Basic Strategy for Improvement of Family Health Statistics in Korea" has been implemented since January, 1991, with financial support from Korea Institute for Health and Social Affairs (KIHASA) and WHO. The study proposal for the project was submitted to WHO on January 24, 1991, and Contructual Service Agreement on the project was made between WHO and Korea Institute for Health and Social Affairs (KIHASA) on September 15, 1991.

Recently, the Supreme Court has revised the law of civil registration, so that all birth registrations require a birth certificate signed by attending physicians, midwives, or others at delivery, starting from January 1st, 1991. However, even in this revision, the certificate form does not include the medical and health information necessary for risk assessment of the newborn and the mother. Early identification of children who might later develop handicaps or abnormalities has gained importance in the last decade as the infant mortality rate has declined.

2. Development of New Birth Certificate Form

The study staff constructed some guidelines in developing the draft of new birth certificate. The guidelines stated that:

i) The form should contain the items useful for collecting health statistics and implementing family health program;

ii) The items in the form can be completed based on the information from the mother's and child's medical history and chart;

iii) The form should be simplified;

iv) The form should be the revised one of the current certificate, rather than new one; and

v) The items 8 and 9 in the current form, which are open-ended questions, should be standardized.

Following the guidelines the study staff developed the darft of

new birth certificate form. The draft consisted of 10 items, and the items 1 through 9 on the draft included the same items as those on the current birth certificate form. The item 10 was added on the draft of new birth certificate form, which would be useful for collecting information on health condition of mother and the new-born. The item 10 consisted of: (i) sociodemographic characteristics of mother, (ii) numbers of mother's pregnancy and birth, (iii) prenatal care, (iv) information related to this pregnancy and delivary, and (v) health status of the new-born.

The study staff decided the new birth certificate be composed of three copies of birth certificate form. The first copy, designed to be issued to parents of the new-born and be attached to birth report form in reporting a birth, was the same as the current certificate, and contained item 1 through 9 only. The second copy, designed to be collected model study staff, contained the duplicated items 1 through 9 of the first copy and new item 10. The third copy, designed to be filed in reporting institutions, was the same as the second copy including health and medical information.

Based on the results of the 1st and 2nd consulting committee meetings, the study staff revised the draft. The medical and health information in the item 10 of the new form was formatted into checkboxes. And the order of list in each checkbox item were reviewed and reordered according to frequency occurred in Korea.

Pretest of the revised draft of new birth certificate form had been implemented for seven days, between May 1 and May 7, 1991. Three medical institutions - Yonsei University Hospital, Hanyang University Hospital, and Cha Hospital were involved in the pretest. The check list of pretest contained item sequence, wording, format, and others.

Based on the results of the pretest, the study staff revised the draft of birth certificate form. The 2nd revision of the form included the items of:

Items 1 through 9: same as the current one
Item 10: medical and health information about mother and child
10-1. Educational attainment of the mother
10-2. Transfers of mother prior to delivery
10-3. Marital status of mother
10-4. Number of spontaneous and induced terminations, and date of the last one
10-5. Date of last live birth
10-6. Month of pregnancy prenatal care began and total number of

prenatal visits
10-7. Clinical estimate of gestation
10-8. Obstetric procedures
10-9. Medical risk factors for this pregnancy
10-10. Method of delivery
10-11. Complications of labor and/or delivery
10-12. Birth weight
10-13. 1 & 5 minute Apgar scores
10-14. Abnormal conditions of the newborn
10-15. Congenital anomalies of child

The manual was prepared by the study staff, and is designed to provide instructions for completing and filing records of birth during the period of the study project.

3. Implementation of Model Study

(1) Selecting study area and institutions

The model study using the new birth certificate form had been implemented in two different settings. One is the institution-based; and the other is community-based.

a. Community-based study

Chungju-Si and Joongwon-Kun in Chungbook Province was selected as the area for the community-based study. The criteria in selecting the community were: (ⅰ) the area with annual live births of about 2,000; (ⅱ) the area with few in- and out-migrants; (ⅲ) the area with government officials' cooperation expected during implementation of the study; and (ⅳ) the area with good relationships between medical doctors and government officials in health center.

In the study area, 8 medical and clinical facilities were related with delivery of birth. Those are: (ⅰ) Chungju Medical Center, (ⅱ) Kunkook University Hospital, (ⅲ) Dr. Lee Chong Soo's Obstetrics and Gynecology Clinic, (ⅳ) Dr. Lee's Obstetrics and Gynecology Clinic, (ⅴ) Dr. Byun's Obstetrics and Gynecology Clinic, (ⅵ) Seong Sim Clinic, (ⅶ) Hong Il Midwife Post, and (ⅷ) MCH Center in Joongwon-Kun Health Center.

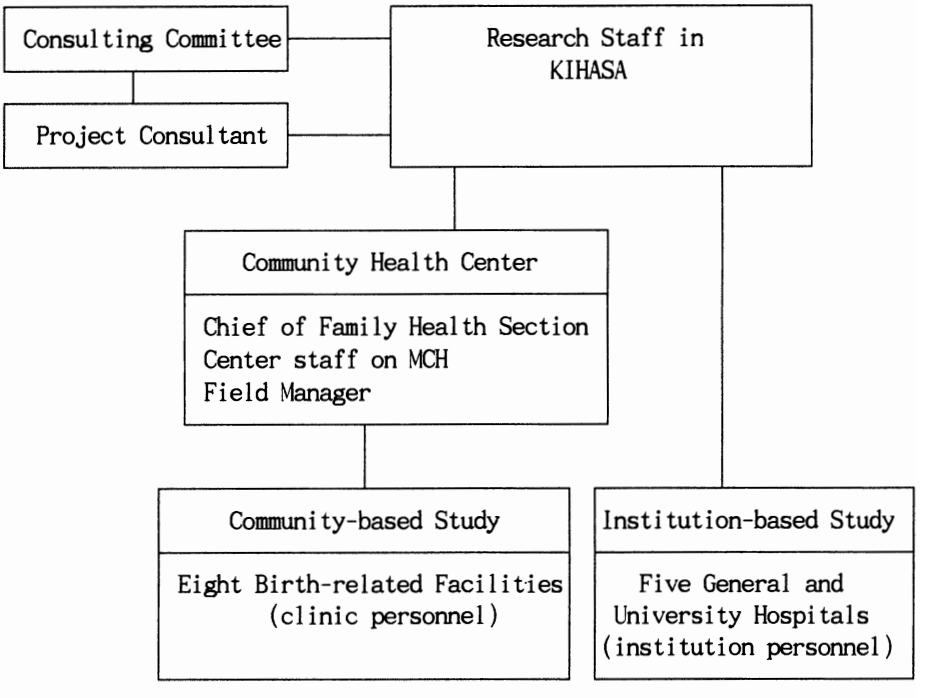
b. Institution-based study

For the institution-based study, 5 university and general hospitals were selected. Those were: (ⅰ) Yonsei University Hospital, (ⅱ) Hanyang University Hospital, (ⅲ) Cha Hospital, and (ⅳ) National Medical Center in Seoul, and (ⅴ) Kyungpuk National University Hospital in Taegu.

(2) Designing the study reporting system

The study staff designed the organization of reporting system of birth registry in the model study as following:

(3) Training the personnel with new birth registry system in the model study



Before implementing the model study, the study staff trained the personnel with new birth registry system in the study. The training program was designed to provide instructions for completing and filing new birth certificate during the implementation of the model study. The training program for the personnel in the community-based study area was implemented in Chungju City Health Center, May 28 and May 29, 1991. The training program for the personnel in the institution-based study was implemented in May 30 and 31, 1991, and the participants in the training program werep physicians in obstetrics and gynecology department, and nurses in labor and delivery room of five hospitals

(4) Implementing the model study

The model study had been implemented since June 1, 1991, to test feasibility of recording the new birth certificate form.

4. Collection and Correction of Data

(1) Institution-based study

To test the feasibility of recording the new form at the hospital setting, each participating institution was assigned to complete new birth certificate form for the child born after June 1, 1991. Each participating institute stopped completing the new form for the model study at the point when the institution completed 200 new birth certificates. Data collected from the institution-based study were as followings:

Institution	Period	Number of Birth Certificates		
		Collected	Incompleted	Completed
Hospital 1	6.1 - 8.17	224	29	195(87.1)
Hospital 2	6.1 - 8.12	195	9	186(95.4)
Hospital 3	6.1 - 6.13	209	42	167(79.9)
Hospital 4	6.1 - 8.28	156	49	107(68.6)
Hospital 5	6.1 - 8.26	200	30	170(85.0)
Total		984	159	824(83.8)

(2) Community-based study

Each participating institution was assigned to complete new birth certificate form for the children born between June 1 and November 30, 1991. Data collected from the institution-based study were as followings:

Institution	Birth Certificates								
	Collected on								
	June	July	Aug.	Sept.	Oct.	Nov.	Total	Incompleted	Completed
1	27	31	65	60	66	42	291	14	277(95.2)
2	34	28	45	36	43	67	253	29	224(88.5)
3	39	38	44	51	39	34	245	19	226(92.2)
4	22	24	47	17	33	48	191	9	182(95.3)
5	1	-	4	-	-	-	5	0	5(100.)
6	10	23	23	17	14	21	108	9	99(91.7)
7	12	8	20	10	6	2	58	3	55(94.8)
8	26	22	19	21	22	31	141	12	129(91.5)
Total	171	174	267	212	223	245	1292	95	1197(92.6)

Improvement of the Accuracy and Validity of the Standardized Birth Certificate Reporting Items

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A birth certificate (BC) issued by the birth attendant (physician, midwife, etc) is required by law for the birth registration from 1 January 1991. To study the way to make use of the BC for the vital data source, the KIHSA developed a new BC by adding items for the health of mother and newborn to the existing BC. Feasibity test for the new BC was carried out in five hospitals from 1 June to 31 October 1991. Accuracy of the BC recording was examined by collating 184 BCs with the corresponding medical records of mother and newborn in one hospital. A personal interview with the medical personel who fills out the BC was conducted for five hospitals in Taegu to study the process of BC issuance.

1. Accuracy of BC recording

Age of mother and father was consistent in about one-quarter of the cases between the BC and medical record. For most of the cases ID number and the permanent address of mother and father were recorded in the BCs but not in the medical records. Address of mother was inconsistent between two records in 10.3% and this was caused by that some mothers gave their native address on admission. The birth date was inconsistent in 6% of the cases and the gestational age (month) was not recorded in 10.9% of the BCs. Sex of the newborn was inconsistent for two cases and not recorded in the BC for six cases. Newborn's name was not recorded in both BC and medical record for all cases and the parity was not recorded in the BC in 42.4%. Physical status of the newborn was described, mostly birth weight, in 85.3% of the cases buy the health status was described only in 5.0%.

In 44% of the cases, complications of delivery were partially recorded in the BC. Health problems of the newborn recorded in the BC were consistent with the newborn's medical record in 20%. The high consistency rate for the congenital anomaly was related with very low incidence rate of the congenital anomaly. Reasons for the low

consistency rate for the record of newborn's health status are that the health ststus of newborn is not recorded accurately in both the delivery logbook and the mother's medical record and that the resident who fills out the BC rarely refers to the newborn's medical record.

2. Process of birth certificate issuance

The process of BC issuance in five hospitals varies from one hospital to another. The BC is initially filled out by a nurse in one hospital and by the mother in the other hospital but invariably the resident who attended the birth has to fill out or review the BC and sign on it. The physicians who fill out the BC rarely understand that the BC is the data source of vital statistics and they do not appreciate the importance of the vital statistics.

3. Guideline for recording birth certificate

Personal interview with the residents who filled out the BC and the faculty supervisor revealed that there is no confusion or conflict in the definition of terms and no major shortcomings in the guideline supplied by the KIHSA.

4. Suggestion to improve the accuracy of BC recording

Review of the medical record forms for mother and newborn in five hospitals revealed that up to 79 different items for mother and 54 items for newborn are supposed to be recorded with minor variation. Most of the items in mother's record are duplicated in the newborn's record. Also the physician's record are duplicated in the nurse's record. However, many of the items are not recorded.

It is desirable to develop a standard summary sheet for delivery which contains both mother's and newborn's health conditions. This summary sheet is itially filled out in triplicate by the birth attendant and two copies of them are transfered to the newborn nursery with the baby. On dischange of the newborn a nursery staff fills out the newborn's health part of the summary sheet and returns one copy to the maternity ward. The resident who fills out the BC refers to the summary sheet.

To ensure the completeness of recording the BC and reporting the birth, it may be considered to make the hospitals submit the BC along with the claim for delivery services to the medical insurance corporation and reimburse the charge for the BC.

Integration of Regional Health Information Network and Birth Certification System

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I. Introduction

During the last two decades, Korea has made considerable progress in economic as well as social developments. At the same time, there has been an increasing number of adolescent pregnancies and a rapid demographic transition from high fertility to lower fertility in the field of Maternity and Child Health (MCH). One of the consequences of lower fertility is a high proportion of deliveries at institutions. In order to keep up with these new changes, there is a need for birth registry system for monitoring the health status of newborns and their mothers. However, there is a lack of medical information in the current birth certificate to do that. Moreover, hospitals are not required to report the births to the registration office or health center, and therefore the government has no formal channel to obtain the health statistics for newborns and their mothers.

To overcome these problems, the Korea Institute of Health and Social Affairs (KIHASA) has revised the birth certificate in such a way to include health information on newborns and their mothers. This paper deals with the integration of the regional health information network with the birth registry system (i.e. the integrated MCH system) in order to improve a collection and a management of health information on newborns and their mothers. This integrated system will produce useful information for detecting and monitoring high risk infants and mothers. In addition, this paper also discusses the probable risk factors for the successful implementation of the integrated system and their inhibiting strategies.

II. Current Status of Regional Health Information Network (RHIN)

Before the discussion of the integrated system, a current status

of RHIS is briefly reviewed here.

1. Health Center System

1) Overview

There are two primary objectives for the health center system: to provide information to help managers plan for new health programs and monitor the progress of on-going programs and to provide information to improve productivity of health workers. That is, this system has a decision supporting component as well as a transaction processing component. With these objectives, Yonsei University has developed and implemented the rural model at the Kangwha Health Center since 1987 with the financial support from WHO and the urban model at the Suwon Health Center since 1990 with the support from the Suwon City Government. The urban model was developed using a local area network (LAN) approach with 20 PCs.

2) Functions

(1) Primary Health Care

This function processes treatment data for outpatients who visited health center to manage patient records and to produce reports for insurance claims and drug management.

(2) Family Planning

This function handles registration of eligible couples, supply of contraceptives, and produces reports on contraceptive surgery and other family planning activities.

(3) Maternity and Child Health (MCH)

This function deals with the registration of eligible couples, prenatal care, delivery care, postnatal care, vaccination, and report generation.

(4) Tuberculosis control

This function deals with case finding, patient registration, initial treatment, secondary treatment, follow-ups, discharge, and report generation.

(5) Drug inventory management

This function deals with purchace, allocation, return of drug, inventory management of drug, and report generation.

(6) Management of equipments and supplies

This function deals with purchace, allocation, repairment, dispose, rental of equipments and supplies, and report generation.

(7) General Administration

This function deals with an issuing of medical certificates , billing, and report generation for various administrative activities.

2. Health Subcenter System

One major difference between health center system and health subcenter system is an addition of a master database for the entire residents in the township. This database helps monitor a health status of residents, especially high risk group. A half of health subcenters in the Kangwha county are computerized at this point, and the remaining half will be computerized by the end of this year.

3. Health Post System

Health post system is very similar to a health subcenter system except that the master database for residents includes some housing data (e.g. kitchen and bath room facilities) as well as sanitary data for the town. At present, two health posts located in the Kangwha county are computerized.

4. Tuberculosis Surveillance System

TB is still a serious health problem in Korea. One major problem with a management of TB is that case findings are so difficult because only 20% of TB cases are treated in the public institutions and the majority of cases are not well reported. In order to detect and register these missing TB cases, the researchers from the Yonsei University are currently developing a TB surveillance system for the Kyunggi Province as a demonstration project. This system consists of the entire health center systems in the Province, Provincial health department system, TB Association system, health insurance system, national registration system, and an inter-connecting network. The TB cases who are already registered in the health center are reported through the network. To help detect TB cases who are treated by private physicians, the health insurance system produces lists of TB cases from insurance payment file by districts and sends them to health centers for verification.

III. Integration of Regional Health Information Network with Birth Certification System

A framework for the proposed integration approach of RHIN with birth certification system, which is called the integrated MCH system, and the expected benefits of this system are briefly discussed here. As seen in Figure 1, the revised birth certificates filled out by attending physicians at hospitals will be regularly sent to health centers, and be inputted to the existing MCH database at health center. The health center receives birth and death data from the National registration system, and also receives delivery data obtained from health insurance payment file via provincial health department. Therefore, birth data obtained from the three different sources are compared each other to achieve the maximum accuarcy at the health center.

The health center will send these regional MCH data to provincial health department; and then the provincial department will forward them to the Ministry of Health and Social Affairs (MOHSA), Korean Family Planning Association, and Korea Institute of Health and Social Affairs (KIHASA). The health insurance coorperative will send delivery data by region to the provincial health department for verification and detection of missing deliveries at the health centers. The primary reponsibilities for KIHASA will be an evaluation of overall effectiveness of the integrated MCH system, identification of risk factors related to birth, development of training material for doctors, nurses, and midwives.

There are several expected benefits when the integrated system is implemented. First, the system will produce new information for detecting and monitorint hisgh risk infants and mothers who are in priority need of MCH services at each level. Second, the system will facilitate birth registration data linkage with other related data such as: health insurance payment file, residence registration file from the National registration system, and MCH data obtained from ehalth center, health subcenter, and health post.

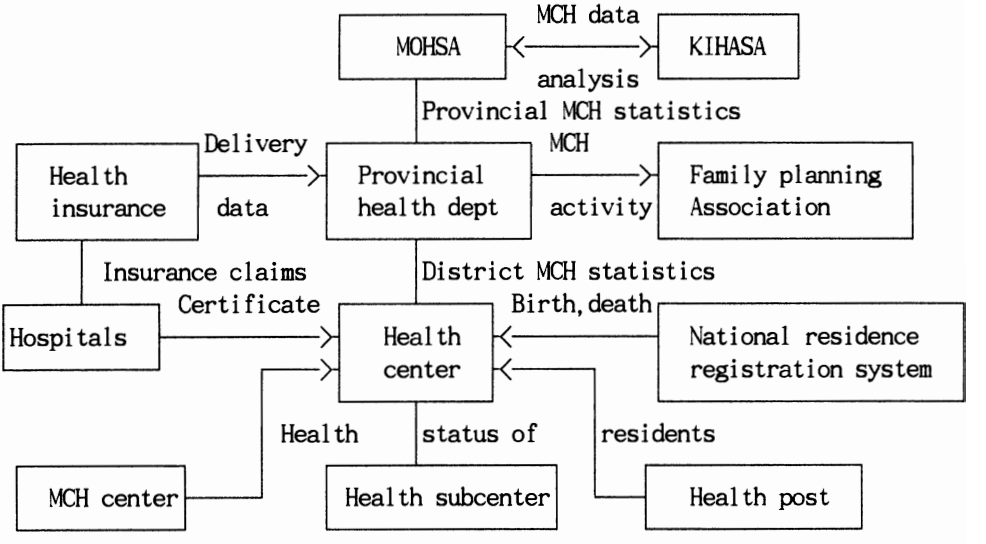

Figure 1. Overview of the integration of RHIN with birth certification system

IV. Implementation Strategy

1. Risk Factors

There are several risk factors which may prevent successful implementation of the integrated MCH system. First risk factor is a technical problem with hardware and software. If a computer in the health post which is located in the remote area is broken, it could cause serious inconvenience to user. Second risk factor is a user resistance to computer. When a computer is first introduced to an organization, it affects the way to carry out tasks and this can cause inconvenience and confusion to users. Third risk factor is a lack of coordination among the related institutions. For instance, if hospitals are unwilling to send birth certificates to the health center in time, the system would not function well.

2. Implementation Strategies

To effectively deal with such risk factors, several implementation strategies are suggested. First, a regional information center should be established at each province to handle hardware and software problems within the region in a timely manner.

Second, users should be trained with computer operation and handling the revised birth certificates on a regular basis. Third, a strong administration support should be carried out to improve a coordination among the related institutions.

Appendix E
Tabulations of the Collected Data

<Table-1> Mother's City and County of Residence: Community-based Study

Residence	Number	Percentage
Chungju Shi[1)]	20	1.5
Choongju Shi	780	60.4
Chechon Shi	15	1.2
Chongwon Kun[2)]	1	0.1
Jinchon Kun	2	0.2
Koisan Kun	16	1.2
Eumsong Kun	35	2.7
Chungwon Kun	196	15.2
Chewon Kun	9	0.7
Tanyang Kun	2	0.2
Other areaa	215	16.6
Unknown	1	0.1
Total	1292	100.0

<Table-2> Mother's City and Province of Residence: Community-based Study

Province	Number	Percentage
Seoul	69	5.3
Pusan	12	0.9
Taegu	3	0.2
Taejon	3	0.2
Kwangju	1	0.1
Inchon	13	1.0
Kyungki province	73	5.7
Kwangwon province	10	0.8
Chungbuk province	1076	83.3
Chungnam province	5	0.4
Chonbuk province	1	0.1
Chonnam province	5	0.4
Kyungbuk province	8	0.6
Kyungnam province	11	0.9
Unknown	2	0.2
Total	1292	100.0

<Table-3> Mother's Age

Age	Community-based Study	Institution-based Study	Total
15-19	2.2(29)	0.8(8)	1.6(37)
20-24	34.1(440)	18.2(179)	27.2(619)
25-29	48.9(632)	56.1(552)	52.0(1184)
30-34	12.7(164)	22.1(217)	16.7(381)
35-40	1.9(25)	2.8(28)	2.3(53)
40+	0.1(1)	-	0.1(1)
Unknown	0.1(1)	-	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-4> Mother's Economic Activity

Economic Activity	Community-based Study	Institution-based Study	Total
Active	5.2(67)	16.2(159)	9.9(226)
Not active	94.8(1225)	83.8(825)	90.1(2050)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-5> Mother's Educational Attainment

Education (in years)	Community-based Study	Institution-based Study	Total
0	0.5(7)	0.2(2)	0.4(9)
1-6	4.2(54)	1.3(13)	2.9(67)
8-9	20.2(260)	6.2(61)	14.1(321)
10-12	63.6(822)	51.2(504)	58.3(1326)
13-16	11.0(143)	38.4(378)	22.9(521)
17-19	-	2.0(20)	0.9(20)
Unknown	0.3(6)	0.6(6)	0.5(12)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-6> Mother's Transfer

Transfer	Community-based Study	Institution-based Study	Total
Yes	10.5(136)	28.1(276)	18.1(412)
No	89.5(1156)	71.8(707)	81.8(1863)
Unknown	-	0.1(1)	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-7> Father's Occupation

Occupation	Community-based Study	Institution-based Study	Total
None	3.4(44)	3.2(31)	3.3(75)
Professional & technical	11.3(146)	12.9(127)	12.0(273)
Administrative & managerial	42.8(554)	55.9(550)	48.4(1104)
Sales	0.5(6)	0.8(8)	0.6(14)
Service	22.8(294)	17.7(174)	20.6(468)
Agricultural & forestry	7.2(93)	1.8(18)	4.9(111)
Production	8.7(113)	3.5(34)	6.5(147)
Not classified	0.9(11)	0.4(4)	0.7(15)
Unknown	0.7(9)	-	0.4(9)
No respnse	1.7(22)	3.8(38)	2.6(60)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-8> Type of Facility of the Delivery: Community-based Study

Facility	Number	Percentage
Clinic	549	42.5
Hospital	544	42.1
MCH center	58	4.5
Midwife post	141	10.9
Total	1292	100.0

<Table-9> Sex of the Newborn

Sex	Community-based Study	Institution-based Study	Total
Unknown	0.1(1)	0.6(6)	0.3(7)
Male	54.6(705)	54.6(537)	54.6(1242)
Female	45.3(586)	44.8(441)	45.1(1027)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-10> Plurality of the Delivery

Plurality	Community-based Study	Institution-based Study	Total
Single	99.2(1282)	98.2(966)	98.8(2248)
Multiple	0.8(10)	1.8(18)	1.2(28)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-11> Number of Live Births

Live Births	Community-based Study	Institution-based Study	Total
Total	100.0(1292)	100.0(984)	100.0(2276)
(Live Births)			
None	54.5(704)	59.7(587)	56.7(1291)
1	37.5(484)	34.6(340)	36.2(824)
2	5.7(74)	5.1(50)	5.4(124)
3	1.5(20)	0.4(4)	1.1(24)
4	0.5(7)	0.3(3)	0.4(10)
5+	0.2(3)	-	0.1(3)
(Now Living)			
None	55.0(710)	60.5(595)	57.3(1305)
1	37.4(483)	35.8(352)	36.7(835)
2	5.7(74)	3.3(32)	4.7(106)
3	1.2(16)	0.2(2)	0.8(18)
4	0.5(7)	0.3(3)	0.4(10)
5+	0.2(2)	-	0.1(2)
(Now dead)			
None	98.8(1277)	97.6(960)	98.8(1277)
1	1.1(14)	2.2(22)	1.1(14)
2	0.1(1)	0.2(2)	0.1(1)
(Fetal deaths)			
None	99.7(1288)	99.6(980)	99.6(2268)
1	0.3(4)	0.4(4)	0.4(8)

<Table-12> Marital Status of Mother

Marital Status	Community-based Study	Institution-based Study	Total
Married	97.6(1261)	98.1(965)	97.8(2226)
Not-married	2.4(31)	1.9(19)	2.2(50)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-13> Spontaneous Abortion

Number of Abortion	Community-based Study	Institution-based Study	Total
0	90.2(1165)	86.0(846)	88.3(2011)
1	7.7(100)	10.6(104)	8.9(204)
2	1.5(20)	2.4(24)	1.9(44)
3	0.2(3)	0.7(7)	0.4(10)
4	0.1(1)	0.1(1)	0.1(2)
5	0.1(1)	-	0.1(1)
6	0.2(2)	0.1(1)	0.2(3)
7+	-	0.1(1)	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-14> Induced Abortion

Number of Abortion	Community-based Study	Institution-based Study	Total
0	63.3(818)	60.1(592)	62.0(1410)
1	23.5(304)	23.5(231)	23.5(535)
2	9.7(125)	11.2(110)	10.3(235)
3	2.6(33)	3.5(34)	2.9(67)
4	0.5(6)	1.0(10)	0.7(16)
5	0.3(4)	0.2(2)	0.3(6)
6	0.1(1)	0.4(4)	0.2(5)
7+	0.1(1)	0.1(1)	0.1(2)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-15> Spacing between this Birth and Last Live Birth

Spacing	Community-based Study	Institution-based Study	Total
Multiple births	0.4(4)	0.8(8)	0.6(13)
< 12 months	0.9(9)	0.6(6)	0.7(17)
12-18 months	5.4(70)	4.0(39)	4.8(109)
18-24 months	9.7(125)	6.8(67)	8.4(192)
24-30 months	7.9(102)	6.0(59)	7.1(161)
30-36 months	5.9(76)	4.6(45)	5.3(121)
36-42 months	4.0(52)	3.4(33)	3.7(85)
42-48 months	3.9(50)	3.3(32)	3.6(82)
48-54 months	1.6(21)	2.2(22)	1.9(43)
54-60 months	1.2(15)	1.4(14)	1.3(29)
60+ months	4.4(57)	4.8(47)	4.6(104)
Not-applicable	54.7(708)	62.1(612)	58.0(1320)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-16> Prenatal Pregnancy Care

Prenatal Care	Community-based Study	Institution-based Study	Total
Received	85.7(1107)	94.9(934)	89.6(2041)
Not-received	14.2(184)	5.1(50)	10.3(234)
Unknown	0.1(1)	-	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-17> Weeks of Pregnancy Prenatal Care Began

Meeks	Community-based Study	Institution-based Study	Total
0	14.1(182)	5.2(51)	10.2(233)
2-4	0.9(11)	4.2(41)	2.3(52)
5-8	21.0(272)	28.0(275)	24.0(547)
9-12	19.4(251)	14.3(140)	17.2(391)
13-16	7.4(96)	10.2(100)	8.6(196)
17-20	5.8(75)	6.5(64)	6.1(139)
21-24	4.4(57)	2.8(28)	3.7(85)
25-28	4.1(53)	5.2(51)	4.6(104)
29-32	3.9(50)	5.2(52)	4.5(102)
33-36	5.3(68)	6.6(66)	5.9(134)
37-40	10.8(140)	9.1(90)	10.1(230)
41-42	1.7(22)	1.8(18)	1.8(40)
Unknown	1.2(15)	0.9(8)	1.0(23)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-18> Total Number of Prenatal Visits

Number of Visits	Community-based Study	Institution-based Study	Total
0	14.1(182)	5.2(51)	10.2(233)
1	7.5(97)	9.6(94)	8.4(191)
2	9.1(118)	4.2(41)	7.0(159)
3	8.6(111)	5.1(50)	7.1(161)
4	9.5(123)	6.7(66)	8.3(189)
5	8.8(114)	7.4(73)	8.2(187)
6	8.0(103)	7.9(78)	8.0(181)
7	8.4(109)	8.8(87)	8.6(196)
8	11.1(143)	10.8(106)	10.8(249)
9	3.4(44)	5.0(49)	4.1(93)
10	6.0(78)	13.9(137)	9.4(215)
11	2.1(27)	3.5(34)	2.7(61)
12	1.5(20)	5.5(54)	3.3(74)
13	0.5(6)	1.8(18)	1.1(24)
14+	0.7(9)	3.1(31)	1.8(40)
Unknown	0.6(8)	1.5(15)	1.0(23)
Total	100,0(1292)	100.0(984)	100.0(2276)

<Table-19> Length of Gestation

Length of Gestation	Community-based Study	Institution-based Study	Total
22 weeks	0.2(2)	-	0.1(2)
26	0.1(1)	-	0.1(1)
27	-	0.1(1)	0.1(1)
28	-	0.1(1)	0.1(1)
29	0.1(1)	-	0.1(1)
30	-	0.3(3)	0.2(3)
32	0.1(1)	0.3(3)	0.2(4)
33	-	0.9(9)	0.4(9)
34	0.1(1)	0.8(8)	0.4(9)
35	0.4(5)	1.1(11)	0.7(16)
36	1.1(14)	2.3(23)	1.6(37)
37	2.3(30)	4.8(47)	3.4(77)
38	9.8(127)	14.8(146)	11.9(273)
39	19.8(255)	26.6(262)	22.7(517)
40	39.5(511)	26.0(256)	33.6(767)
41	17.2(223)	16.8(165)	17.0(388)
42	8.2(106)	4.2(41)	6.4(147)
43	0.6(9)	0.5(5)	0.6(14)
44	-	0.1(1)	0.1(1)
Unknown	0.5(6)	0.2(2)	0.3(8)
Total	100.0(1292)	100.0(984)	100.0(2276)
mean	39.7	39.2	39.5

<Table-20> Obstetric Procedures

Procedures	Community-based Study	Institution-based Study	Total
Received	82.5(1066)	86.4(850)	84.2(1916)
Not-received	17.3(223)	13.6(134)	15.7(357)
Unknown	0.2(3)	-	0.1(3)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-21> Type of Obstetric Procedures Used during Pregnancy

Procedures	Community-based Study	Institution-based Study	Total
Amniocentesis	0.4(5)	2.5(25)	1.3(30)
Electronic monitor	26.6(344)	52.5(517)	37.8(861)
Ultrasound	72.0(930)	72.9(717)	72.4(1647)
Induction of labor	7.0(90)	19.9(196)	12.6(286)
Stimulation of labor	3.5(45)	20.6(203)	10.9(248)
Tocolysis	0.2(2)	8.5(84)	3.8(86)
Others	1.6(21)	0.6(6)	1.2(27)

* The percentages are based on 1,292 cases for the community-based model study, and 984 cases for the institution-based model study.

<Table-22> Method of Delivery

Method	Community-based Study	Institution-based Study	Total
Vaginal			
Natural	66.7 (862)	61.3 (603)	64.3 (1465)
Forceps	0.5 (7)	0.6 (6)	0.6 (13)
Vacuum	2.6 (33)	7.3 (72)	4.6 (105)
After C-section	-	0.4 (4)	0.2 (4)
C-section			
Primary	22.9 (296)	19.3 (190)	21.4 (486)
Repeat	7.2 (93)	11.0 (108)	8.8 (201)
Unknown	0.1 (1)	0.1 (1)	0.1 (2)
Total	100.0 (1292)	100.0 (984)	100.0 (2276)

<Table-23> Risk Factors for this Pregnancy

Risk Factors	Community-based Study	Institution-based Study	Total
One or more	10.7(138)	31.6(311)	19.7(449)
None	89.3(1154)	68.3(672)	80.2(1826)
Unknown	-	0.1(1)	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-24> Type of Risk Factors Experienced by Mother

Risk Factors	Community-based Study	Institution-based Study	Total
Anemia	5.4(70)	15.7(154)	9.8(224)
Cardiac disease	0.2(3)	1.5(15)	0.8(18)
Lung disease	-	0.8(8)	0.4(8)
Diabetes	-	0.5(5)	0.2(5)
Hypertension, chronic	0.1(1)	0.3(3)	0.2(4)
Hypertension, pregnancy	2.1(27)	3.9(38)	2.9(65)
Renal disease	0.3(4)	0.3(3)	0.3(7)
Eclampsia	-	0.5(5)	0.2(5)
Genital herpes	0.1(1)	0.3(3)	0.2(4)
Uterine bleeding	1.1(14)	0.6(6)	0.9(20)
Incompetent cervix	0.2(2)	0.4(4)	0.3(6)
Hydramnios	0.1(1)	0.2(2)	0.1(3)
Rh sensitization	-	0.2(2)	0.1(2)
Previous preterm infant	0.5(7)	1.8(18)	1.1(25)
Previous 4000+ grams	0.7(9)	0.5(5)	0.6(14)
Others	1.5(20)	8.4(83)	4.5(103)
Total	1292	984	2276

* The percentages are based on 1,292 cases for the community-based model study, and 984 cases for the institution-based model study.

<Table-25> Complications of Labor and Delivery

Complications	Community-based Study	Institution-based Study	Total
One or more	36.8(475)	36.9(363)	36.8(838)
None	63.2(817)	62.9(619)	63.1(1436)
Unknown	-	0.2(2)	0.1(2)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-26> Type of Complications Present during Labor and Delivery

Complications	Community Study	Institution Study	Total
Pre rupture of membrane	5.4(70)	9.3(92)	7.1(162)
Dysfunctional labor	1.5(20)	1.0(10)	1.3(30)
Cephalopel. disproportion	15.7(203)	7.9(78)	12.3(281)
Breech/malpresentation	3.2(41)	3.0(30)	3.1(71)
Placenta previa	0.3(4)	0.8(8)	0.5(12)
Abruptio placenta	0.2(2)	0.1(1)	0.1(3)
Excessive bleeding	1.5(19)	1.3(13)	1.4(32)
Meconium	5.7(73)	4.9(48)	5.3(121)
Fetal distress	0.5(7)	1.5(15)	1.0(22)
Precipitous labor	1.2(16)	0.6(6)	1.0(22)
Prolonged labor	0.9(11)	0.7(7)	0.8(18)
Cord prolapse	0.1(1)	-	0.1(1)
Seizures during labor	0.1(1)	0.4(4)	0.2(5)
Febrile (> 100°F or 38°C)	0.2(3)	0.3(3)	0.3(6)
Anesthetic complications	0.1(1)	-	0.1(1)
Others	4.4(57)	12.2(120)	7.8(177)
Total	1292	984	2276

* The percentages are based on 1,292 cases for the community-based model study, and 984 cases for the institution-based model study.

<Table-27> Birth Weight

Weight	Community-based Study	Institution-based Study	Total
< 1500g	0.2(3)	0.5(5)	0.4(8)
1500-2000g	0.5(7)	1.9(18)	1.1(25)
2000-2500g	2.7(35)	5.8(57)	4.0(92)
2500-3000g	24.2(313)	23.8(234)	24.0(547)
3000-3500g	49.1(634)	45.6(449)	47.6(1083)
3500-4000g	19.3(249)	19.6(193)	19.4(442)
4000+ grams	4.0(51)	2.8(28)	3.5(79)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-28> Apgar score - 1 Minute

Apgar score	Community-based Study	Institution-based Study	Total
1-3	0.6(8)	1.3(13)	0.9(21)
4-6	3.6(33)	7.0(69)	4.5(102)
7+	96.6(1249)	91.7(902)	94.5(2151)
Unknown	0.2(2)	-	0.1(2)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-29> Apgar score - 5 Minutes

Apgar score	Community-based Study	Institution-based Study	Total
1-3	0.1(1)	0.2(2)	0.2(3)
4-6	0.7(9)	1.1(11)	0.8(20)
7+	99.0(1279)	98.7(971)	98.8(2250)
Unknown	0.2(3)	-	0.2(3)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-30> Abnormal Conditions of the Newborn

Conditions	Community-based Study	Institution-based Study	Total
Associated	1.5(20)	6.4(63)	3.6(83)
Not-associated	8.4(1171)	93.6(921)	96.3(2192)
Unknown	0.1(1)	-	0.1(1)
Total	100.0(1292)	100.0(984)	100.0(2276)

<Table-31> Type of Abnormal Conditions of the Newborn

Abnormal Conditions	Community Study	Institution Study	Total
Anemia	-	0.2(2)	0.1(2)
Hyaline membrane disease	0.2(2)	0.5(5)	0.3(7)
Meconium aspiration	0.4(5)	1.2(12)	0.7(17)
Assisted ventilation <30	0.6(8)	1.0(10)	0.8(18)
Assisted ventilation >30	0.1(1)	0.2(2)	0.1(3)
Others	0.5(7)	3.6(35)	1.8(42)
Total	1292	984	2276

* The percentages are based on 1,292 cases for the community-based model study, and 984 cases for the institution-based model study.

<Table-32> Congenital Anomalies of Child

Anomalies	Community-based Study	Institution-based Study	Total
Present	0.3(4)	1.2(12)	0.7(16)
Not-present	99.7(1288)	98.8(972)	99.3(2260)
Total	100.0(1292)	100.0(984)	100.0(2276)

〈Table-33〉 Type of Congenital Anomalies Present to Child

Congenital Anomalies	Community Study	Institution Study	Total
Heart malformations	-	0.1(1)	0.0(1)
Circulatory/respiratory	0.1(1)	-	0.0(1)
Urogenital	-	0.2(2)	0.1(2)
Cleft lip	0.1(1)	0.1(1)	0.1(2)
Clib foot	-	0.1(1)	0.0(1)
Others	0.2(2)	0.7(7)	0.4(9)
Total	1292	984	2276

* The percentages are based on 1,292 cases for the community-based model study, and 984 cases for the institution-based model study.