



“Diagnostic and Treatment Capacity Strengthening of the National Center for Maternal and Child Health – II”

Project Proposal

Project Implementation Organizations:

**Ministry of Health of Mongolia
National Center for Maternal and Child Health**

Ulaanbaatar

2017

EXPECTED OUTPUT OF THE PROJECT

The strengthened diagnostic and treatment capacity of the National Center for Maternal and Child Health (NCMCH) will lead to enhanced quality and availability of tertiary level referral health care services for women, mothers and children of the country.

EXPECTED OUTCOMES OF THE PROJECT

- Strategic goals and objectives of NCMCH will be fulfilled. Hence the center's diagnostic; treatment, training and research capacity, quality and efficiencies will be improved.
- Modern and advanced technology of diagnosis and treatments (such as MRI, high performance ultrasonic diagnostics, biopsy/pathologic diagnostic technology, diagnostic imaging e-PACS system and technology of continuous treatment of critical patients etc.,) will be introduced in healthcare services of obstetrics and gynecology (OB-GYN), pediatrics and pediatric surgery.
- The quality of clinical training and the clinical performance of pediatricians, OB-GYNs and medical professionals will be improved through enhanced favourable simulation conditions.
- Electronic distribution and control system of medicines and medical supplies will be built.
- NCMCH will be able to provide professional tertiary healthcare services for Mongolian mothers, women and children according to world standards. Furthermore, the maternal and child mortality rates will be reduced, and the Sustainable Development Goals accomplishment will be expected.

DURATION OF THE PROJECT: 2017 – 2018

ESTIMATED BUDGET: 7 million Euros (Exchange rate of Mongol bank, 1 euro = ₮)

THE PROJECT COMPONENTS: The proposed project consists of three components as follows:

1. Renovation and installation of equipments.
2. Civil works and improvement.
3. Training.

Table 1. Project components

No	Project component	Budgets (Euros)	Comment
1	Renovation of equipment		Renovation and upgrade of equipment
2	Reconstruction work		Reconstruction works for equipment installation rooms
3	Training		Training to improve the capacity of health care professionals, technicians on usage of the new

			technologies
	Total	7,000, 000.00	

I. PROJECT JUSTIFICATION, GOAL, OBJECTIVES AND BACKGROUND

1.1. Background

NCMCH is a referral center that provides specialised health care for mothers, women, fetuses-newborns, children, and focuses on professional and technical supports at the national level (The center has more than 90-year histories and is one of the oldest Mongolian hospitals).

NCMCH is responsible for developing diagnostic and treatment guidelines, standards and methodological recommendations; and also provides postgraduate training and refresher courses for medical professionals in maternal and child health fields; and organises national research activities. The center is a key institution in the maternal and child morbidity and mortality surveillance system.

As mentioned above, since NCMCH is the only tertiary level care hospital the most severe and complicated patients with unclear diagnosis are referred to the center from all sectors and all levels hospitals around the country and is required to provide equity of access to treatment and services.

Thus, the Mongolian Government and Ministry of Health and Sports have kept investment in, and attention to sustain necessary medicines and medical supplies security and to invest of technological innovation in step in order to meet the international standards of diagnosis and treatment of the of severe and complicated cases with unknown diagnosis.

The Mongolian Government is committed to placing more emphasis on the diagnostic and treatment capacity strengthening of the center, hence on reducing maternal and child mortality and fulfillment the objectives of MDG.

1.2. Project goal and objectives

The overall goal of the project is to improve the quality and availability of healthcare services and to focus on providing guarantees of customer satisfaction.

One of the main conditions for the implementation of this goal is to introduce a new advanced technology that being widely used in modern medicine.

As a direct continuation of the previous successfully implemented short-term project we will set up the goal and objectives in order to fully utilise technological innovations that already reached during the previous project and to complete the unsolved technological innovations of other sectors.

1.3. Cooperation in this field, experiences and results

On June 20 2014, the NCMCH, the Ministry of Health, Mongolia and the Vamed Engineering GmbH & CO KG have jointly established and signed the tripartite agreement with number 132.466/NCMCH/2014 in the Room No.201 of Ministry of Health, Mongolia.

During 2014-2016, the Medical Equipment Supply and Human Resource Strengthening Project by the Austrian Government Soft Loan Investment has successfully completed. The project consisted of 3 main components as follows:

1. Clinical training (Local and international training)

To strengthening the capacity of medical professionals and to improve the utilisation of new technologies: **23** doctors and medical professionals of the centre were participated **the international training** for 1-3 months in Austria. The **local trainings were** organized at NCMCH. Foreign professors/experts organized series of training in the workplace for technicians, bio-engineers, doctors and health professionals of the centre.

2. Partial reconstruction works

Partial reconstruction works were done for some equipment installation places/rooms. Totally, 4 areas are equipped with a complete maintenance. For example, (1) Morgue and mortuary refrigerators and freezers rooms; (2) CT scan rooms (3) Digital X-ray room; (4) 2 blocks of Neonatology Pathology Department.

3. Equipment renovation

NCMCH has received **297** units of **105 types of equipments**. The equipment such as the latest high-performance diagnostic imaging and laboratory equipment and technologies; equipment for intensive care, reanimation and emergency care; surgical and delivery room equipment; equipment for OB-GYN and pediatric subspecialties; devices and equipment for medical disinfection and sterilization processes, morgue and mortuary refrigerators and freezers are being operated at the center.

Conclusions:

- The project supplied the latest modern equipment that produced in the European Union, and all the equipments are being operated at NCMCH.
- The project has pioneered the usage of some equipment in NCMCH, as well as in Mongolian medical industry.
- In 90 years history of development, the NCMCH has equipped the most modern technologies for the first time.

In 2016, NCMCH started using all new technique and technologies and we worked hard to adopt the new technologies. Slogans have risen to **“Build a solid foundation for sustainable development basis and walk along with the world’s development”**.

1.4. Justification and opportunities to continue or the project

There is an urgent need and high demand to increase the availability of equipment and introduce new technologies.

A. Current situations and trends of maternal and child health in Mongolia

The development of any country and the health status of the population is defined by maternal and child health indicators. In 2015, Mongolia has become one of the few countries that accomplished the MDG objectives by reducing maternal and child mortalities.

According to the preliminary estimation, the current situation of health care services coverage, the specific features and trends of morbidity and mortality of the center and the increased numbers of infants and young children that related to the increased numbers of births in the country would continue for the next 10-15 years.

In order to sustain the achieved successes of the Mongolian health sectors, to reach the level of developed countries' quality of medical care services, and to fulfil the SDGs of the country, NCMCH needs to be introduced continuously to the new technologies and the comprehensive reform of equipment.

B. Human resource capacity

The technological skills of doctors and medical professionals of the center have enhanced and practiced by accessing new technologies. The human resource capacity of continuously updated equipment and technologies is being built.

C. The new scope of medical services and responsibilities

All types of pediatric cancer are referred to NCMCH and its chemical or surgical treatment is being performed in the center. The 125th order of Minister of Health and Sports, Mongolia (approved on 1st April, 2015) indicates that all pediatric cancer services (except the radiation therapy) should be shifted from National Cancer Center to NCMCH since 2016.

In recent years, the percentages of preterm deliveries and low and very low birth weight babies are increasing. Moreover, the cases of birth defects, congenital metabolic disorders, severe surgical diseases and pediatric cancers have increased.

It is all actively demanding the early detection and early diagnosis of the diseases using high-capacity radiology and biopsy/pathological technologies.

D. Medical equipment availability issues

In recent years, there has been a strong political commitment in Mongolia for the development of health sectors; especially, for the improvement of diagnostic and treatment capacity building of NCMCH. However, only the increased investment and one or couple of projects could not fulfill the growing demands for essential equipment.

Health care needs of the center, the scope and burden of maternal and child morbidity and mortality and the population growth of the country have been constantly increasing the concrete demands.

Despite the increased renovation efforts with full settlement of some kind equipment, the lack of necessary modern equipment is continued. In other hand, due to the overloading usage and wear-out, the certain equipment cannot meet the current demands.

E. Direction towards of technical and technological renovation

In order to fulfill the strategic goal and objectives of NCMCH and to improve the center's diagnostic, treatment, educational and research capacities, quality and efficiencies we need to focus on following reforms:

- Modern and advanced diagnostic and treatment technologies (such as MRI, high performance ultrasound diagnostics, biopsy/pathologic diagnostics, diagnostic imaging e-PACS system and technology of continuous treatment of critical patients etc) will be introduced in healthcare services of obstetrics and gynecology (OB-GYN), pediatrics and pediatric surgery.
- The quality of clinical training and the clinical performance of pediatricians, OB-GYNs and medical professionals will be improved through enhanced favourable simulation conditions.
- Electronic distribution and control system of medicines and medical supplies will be built.

The perfect continuation of equipment renovation of NCMCH will have positive effects on providing professional tertiary healthcare services for Mongolian mothers, women and children according to world standards. Hence, the maternal and child mortality rates will be reduced, and the successful Sustainable Development Goals (SDGs) accomplishment will be expected.

F. Circumstances of the hospital buildings

The current buildings of NCMCH have been lacking of any kind fundamental reconstruction since 1987, when the hospital started functioning. However, there are growing opportunities to introduce new technologies by partial and complete maintenance works of the diagnostic and treatment departments/units in recent years. For example, in 2012-2015 in the scope of the centre, the full range of maintenance civil works were done at 30 departments and units.

In 2015, surgical blocks/departments, intensive care units, emergency departments, delivery rooms and neonatal departments were supplied with 13 diesel generators and these departments/units can work reliably without electricity shortages with the help of newly installed diesel generators.

In 2014, NCMCH has opened 2 new campuses/buildings as a part of the Children's hospital. These new campuses were planned and built to meet the clients' growing needs. The campuses have comfortable and patient safety ensured environments with oxygen and air integrated systems and electrical and air-conditioning systems.

The campuses consist of 2 blocks/buildings and the main building of the campuses connected with the children's hospital via a bridge-channel:

- The main campus - a 6-floor building having sub-specialty pediatric departments of medical care,
- The second campus - a 2-floor building having training and guest professor's hostels.

On the 4th, 5th and 6th floors of the main 6-floor building, the Hematology and oncology department is located. This department provides medical and chemical treatments for children with cancer. Also there are 2 isolating vacuum rooms for patientw with bone marrow transplant. The each room of the department provides comfortable environments (with an alarm system, a TV set, a refrigerator and a bathroom/shower room etc) for children with severe disorders. And there is a well-equipped 5-bed room operating as a "palliative care unit" at the campus.

Within the scope of the previous Austrian Government soft loan project the following 5 maintenance civil works were performed:

- A radiology cabinet (with 38 m² area) of Reproductive Consulting Polyclinic was fully renovated.
- Two rooms (with 60 m² area) of morgue refrigerators and freezers fully renovated.
- A CT scan room (with 56 m² area) was fully renovated.
- A room (with 16m² areas) of dental panoramic X-ray of Pediatric Consulting Polyclinic was renovated.
- Two sections (203 m² area) of Neonatal Pathology Department were renovated.



II. BACKGROUND INFORMATION

2.1. Policies and directions in health care services of Mongolia

Mongolia is one of the world's least densely populated countries with 1.7 person per one square km. Regarding such a large area and a relatively high number of working-age population, the Citigroup experts have announced that Mongolia and other 11 countries as 3G "Global growth Generators" for next 2010-2050 years.

According to the National Statistical Office, in the absence of bright policies to increase the birth rate, the period where the number of working-age group population is greater than the number of population of non-working age group is called as "Demographic window period" will be closed after 15-20 years. Therefore, expanding this window as much as possible to optimize the growth in Mongolia is crucial.

The Sustainable Development Goals are bundled goals to fulfil the future international development; and it is the continuation of the MDGs that completed in 2015.

The **Sustainable Development Goals** are an intergovernmental set of aspiration Goals with 17 goals and 169 targets until 2030. The goals are contained in paragraph 54 United Nations Resolution A/RES/70/1 of 25 September 2015.

The "Mongolian long-term sustainable development" (2016-2030) concept documents that approved by the Mongolian Great Khural have become an important document of the policy directions for health sectors development especially in maternal and child health.

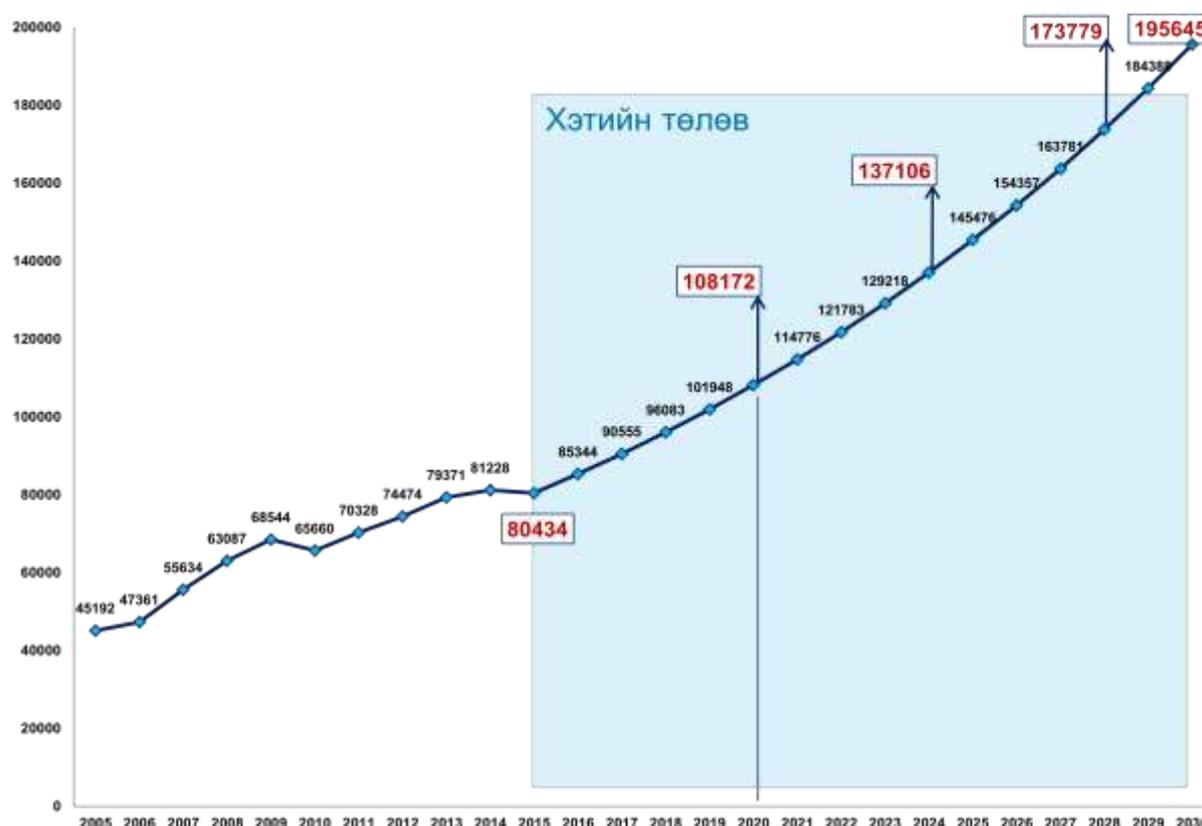
2. 2. A brief description of NCMCH and its functions and health indicators

- NCMCH was founded in 1930 as a part of First Central Hospital ("Citizen's Hospital"). A 15 bedded "**Children's Unit**" that becomes the foundation of the Children's hospital of the NCMCH was established.
- According to the Act 223 of September 13, 1985, by the Mongolian Ministers Council, the decision was made to establish the "**State Maternal and Child United Center**" by integrating the Pediatric Central Hospital with a new Children's Clinic with 300 beds which was built by technical assistance of Soviet Union and a new maternity hospital with 280 beds. The State Maternal and Child United Center moved to the current building in 1987.
- According to Act 43 of February 20, 1987, by the Ministers Council, the structure was made integrating the State Maternal and Child United Center with the State Research Institute of Maternal and Child Health; and the name was changed to **State Research Center on Maternal and Child Health**.
- According to the certain documents (such as an official document of 1a\2131 of June 21, 2011 approved by Minister of Health and Sports of Mongolia, the Decree No.210 of June 23, 2011 on changing name of the center, the decision from enlarged session of the Directors Assembly of June 02, 2011, and General Director's Decree No.118 of June 27, 2011) the structures and arrangements of the Center has updated; and its name became the Gendentsamts's Memorial **National Center for Maternal and Child Health**.

Selected indicators	2011	2012	2013	2014	2015	5 year averages
Number of mothers gave birth	70328	74474	79371	81228	80434	77167
Live births	70576	74778	79780	81715	80875	77545
Stillbirths	499	507	539	528	557	526
Stillbirth rate (per 1000 live births)	7.0	6.7	6.7	6.4	6.8	6.7
Perinatal mortality	1095	1119	1153	1193	1185	1149
Perinatal mortality rate (per 1000 total births)	15.4	14.9	14.4	14.5	14.6	14.7
Neonatal mortality	723	756	771	817	823	778
Neonatal mortality rate (per 1000 live births)	10.2	10.1	9.7	10.0	10.2	10.0
Early neonatal mortality	596	612	614	665	628	623
Early neonatal mortality rate (per 1000 live births)	8.4	8.2	7.7	8.1	7.8	8.0
Late neonatal mortality	127	144	157	152	195	155

Late neonatal mortality rate (per 1000 live births)	1.8	1.9	2.0	1.9	2.4	2.0
Infant mortality	1152	1143	1166	1251	1234	1189
Infant mortality rate (per 1000 live births)	16.3	15.3	14.6	15.3	15.3	15.3
Under 5 mortality	1410	1396	1438	1505	1476	1445
Under 5 mortality rate (per 1000 live births)	20.0	18.7	18.0	18.4	18.3	18.6

Presumption of population growth of Mongolia, 2005-2030



Nowadays, the NCMCH consists of Research Institute; 2 referral tertiary hospitals which have **673 beds** (Children’s hospital and Obstetrical and Gynecological Hospital); **28 sub-specialty departments, 2 Outpatient Departments, Adolescent clinic, Infertility and Reproductive Health Center**; and **11 support service departments**.

The center is a referral center that provides specialized health care for mothers, women, fetuses-newborns, children, and professional; and technical supports at the national level. As of 2015, there were 1123 employees, 245 doctors, 570 nurses and other medical professionals and 319 supporting employees.

Vision of NCMCH: “Healthy Mothers and Children - The State’s Greatest Wealth”

Mission of NCMCH: To provide specialised professional healthcare services for mothers and children by world standards in patient-friendly hospital environments.

Core values of NCMCH:

- Professional, ethical and skilled human resources;
- Equitable, accessible, quality health care services;
- Medical supplies, equipment and techniques, advanced technology and resources which meet the clients' demands;
- Leadership, responsibility and transparency, mission and objectives;
- Family-friendly environment and satisfactory services.



Brief chart of organizational structure

Top management: BOD, Directors' committee, Scientific committee

Quality assurance of medical aid and service



Strategic priorities of the NCMCH:

- To strengthen the integrity of medical research, training and practice;
- To implement evidence-based achievements in medicine and to introduce advanced techniques and technologies;
- To innovate outstanding pediatric surgical technologies in treatment and diagnosis;
- To develop pediatric organ transplant services;
- To provide comprehensive diagnostic and treatment services care for pediatric oncology;
- To develop obstetrics and gynecological services that meet the international standard of excellence;
- To become a National Prenatal and Neonatal Diagnostic Center;
- To become a Model Center for Emergency and Intensive care;
- To innovate an E-Hospital system.

Health Indicators of the NCMCH, 2015:

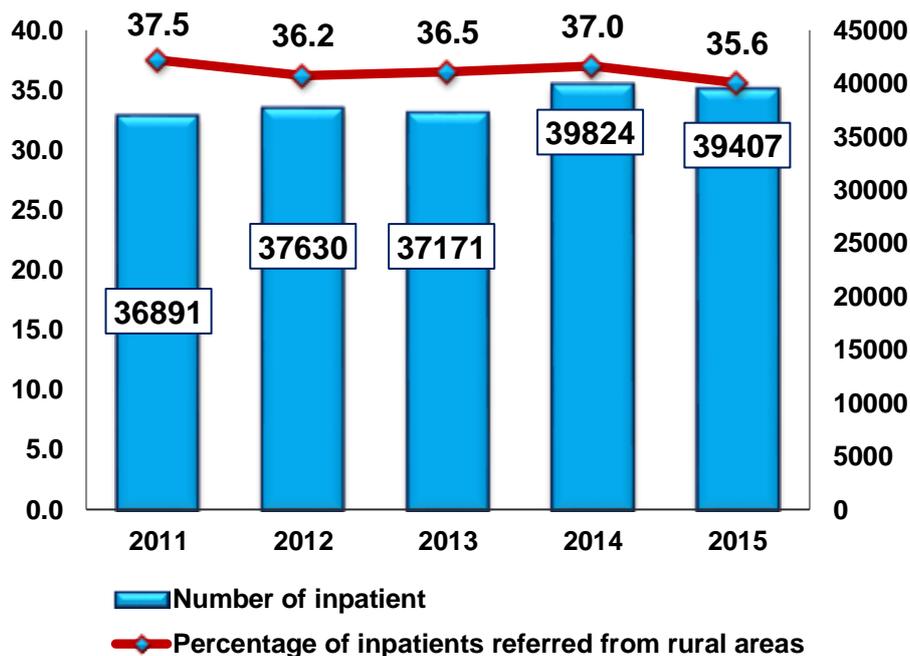
- In 2015, 39407 inpatients were hospitalized at NCMCH. Among them 35.6% were admitted from rural area.

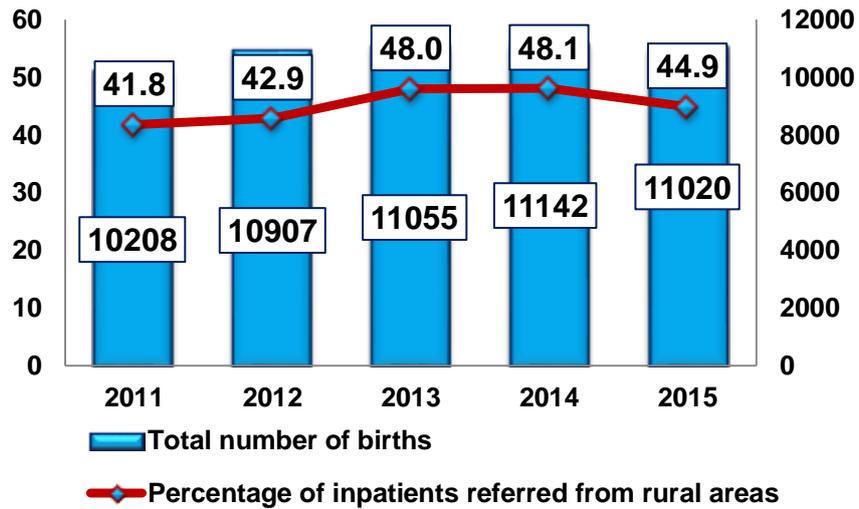
- In 2015, **11020 mothers** gave birth at NCMCH, and the percentage of rural mothers was 44.9%.
- In 2015, **11816 pediatric and obstetric and gynecological surgical operations** were performed at NCMCH.
- In 2015, there were **177786** outpatients at NCMCH, and out of them **27.0% (47923) were from rural area**. Compared to 2014, the number of outpatients was increased by **2545 (1.5%)**.

In 2015, a total of **1364 cases** were reported as having **birth defects** among 162590 live births (from January, 2014 to December, 2015) in Mongolia. The prevalence rate **per 1000 live births of birth defects was 8.4 (0.8% of total live births)**. The most common type (according to ICD 10) of birth defects was congenital malformations of the circulatory system (18.8% or 257 cases), followed by congenital malformations and deformations of the musculoskeletal system (17.1% or 233 cases), multiple birth defects (16.4% or 224 cases), cleft lip and palate (15.2% or 207 cases) and congenital malformations of eye, ear, face and neck (8.6% or 117 cases).

In recent years, the number of births and population are constantly growing in Mongolia. Substantial progress has been made in reducing maternal, infant and under-five mortalities due to implementing national programs to make towards achieving the “Millennium Development Goals”. However, stillbirth, neonatal and perinatal mortality rates are still high. Accordingly, **the growing (1) evidence-based, (2) quality and (3) security services demands for maternal and child health are shown by increased numbers of inpatients, deliveries and outpatients in NCMCH as follows.**

Inpatient admissions increasing

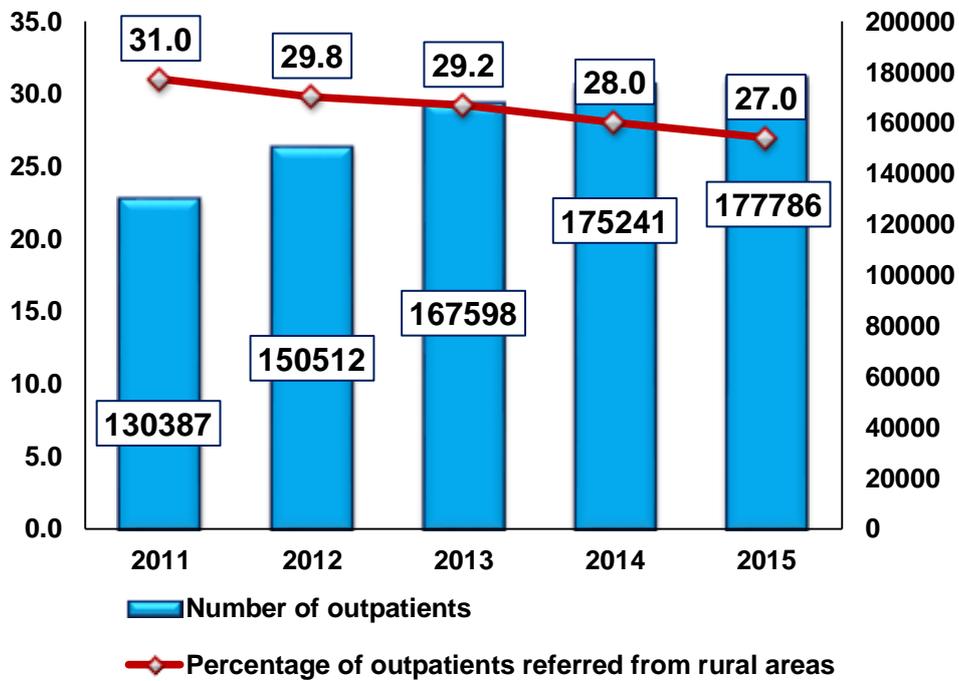


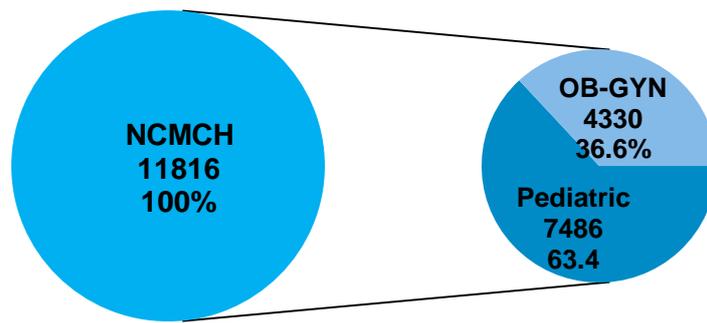


Number of births increasing

Total of **177786** outpatients (including gynecologic, obstetric, and pediatric) visited two Consulting Outpatient Departments (Pediatric Consulting Polyclinic and Reproductive Consulting Polyclinic) of NCMCH.

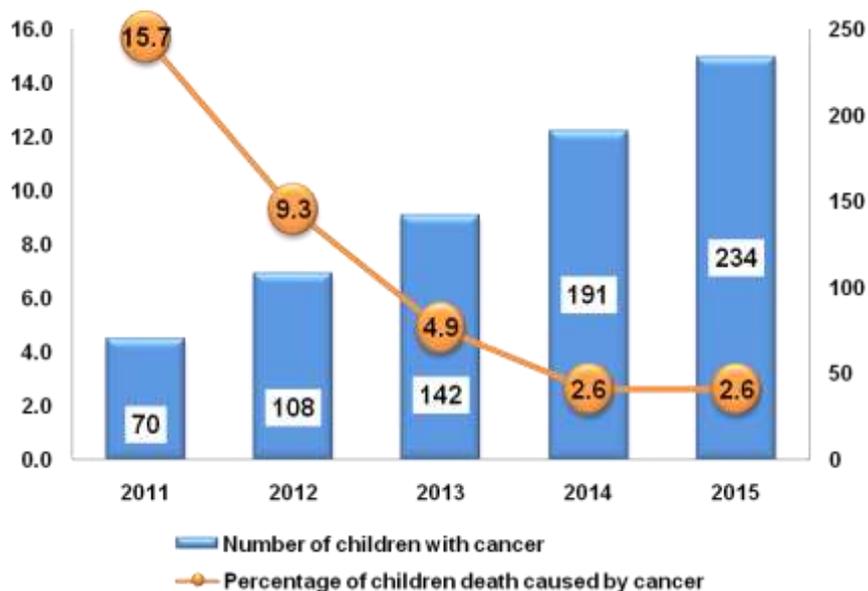
Over 175,000 outpatient visits each year





In 2015, **11816 surgical operations** were performed at the center. Among them 63.4% (7486) was performed in Children’s hospital and 36.6% (4330) in OB-GYN hospital.

In recent years, the number of registered **pediatric cancer** cases has been **increasing. Every year, 41-56 new** cases of cancer is diagnosed among children; and this is a crucial problem.



Selected data	2011 (n=41)	2012 (n=49)	2013 (n=44)	2014 (n=56)	2015 (n=49)
Acute lymphoblastic leukemia	21 51.2	23 46.9	21 47.7	26 46.4	23 46.9
Acute myeloid leukemia	9 22.0	9 18.4	4 9.1	11 19.6	7 14.3
Neuroblastoma	-	-	2 4.5	5 8.9	3 6.1
Non-Hodgkin’s lymphoma	-	-	-	2 3.6	5 10.2
Other	11 26.8	17 34.7	17 38.6	12 21.4	11 22.4

NCMCH is only hospital providing pediatric surgical care at the national level. According to the recent statistical data, cases with birth defects, cancers, pediatric surgical disorders (neonatal, general and specialised pediatric surgical diseases) is growing.

This trend has justified the needs of innovation of new technologies in pediatric surgery and the the improvement of quality and availability of surgical services of the center.



III. DEVELOPMENT OF POLICY AND PLANNING

In 2015, Mongolia became one of the few countries accomplished the objectives of MDG by reducing child and maternal mortalities. In 2015, the infant mortality rate per 1000 live births was **15.3**. It dropped **4.1 times** compared to **1990 (63.4 per 1000 live births)**. In 1990, under-five mortality rate per 1000 live births was **87.5**, while in 2015 the indicator reduced to **18.3** or dropped **4.78 times** compared to 1990. Therefore, Mongolia completely achieved the MDG goal to **reduce the under-five mortality rate by 4 times as of 2015 comparing to 1990**.

Mongolia’s maternal mortality rate (MMR) in 1992 was chosen as a baseline; the MDG goal to reduce maternal mortality by three-quarters between 1992 and 2015 or 50 maternal deaths per 100 000 live births was set. **In 2015**, the mortality rate dropped **4.6 times** compared to **1990** and **7.8 times** compared to the **1992 baseline**. As a result Mongolia has promoted from high MMR country to mid-level MMR country.

Mongolia has huge potentials for further successful sustainability of the already achieved levels while at the same time continuing to improve health care quality performance to world-class level.

First of all, within the scope of “**Sustainable Development Program-2030**” the evidence-based maternal and child health care policies should be properly defined and emphasized on strict implementation.

In order to achieve the “Sustainable development goals-2030” and the Medium-term Strategic Plan (2012-2016) of NCMCH, we aim to become **"High performance medical institution"**.

We have been reviewing the results and fulfilments of the Medium-term Strategic Plan-2012-2016 (with 7 main goals and 44 strategic objectives) and updating the strategic plan. By implementing this updated strategic plans (2017-2021; 2022-2026), the centre will be able to provide patient-centered, high quality specialized health services for women and children in comfortable environments according to the international standards.

In accordance with the health sector policy and the center's Strategic Plan, the **"NCMCH's 2016 Action Plan"** was developed and is being implemented with raised slogans as **"Build a solid foundation for sustainable development basis and walk along with the world's development"**. In order to implement the 2016 goals and the slogans, we need to be committed to the following objectives:

- 1) To acquire new advanced technology and reintroduction
- 2) To continuously improve the quality of medical care and reduce clinical risks
- 3) Human resource development and ensure social guarantees
- 4) To improve the quality of supply services
- 5) To intensify academic training and research works
- 6) To enhance financial management and its transparency

Development plans are working actively towards implementing sub-programs in order to improve the quality and access to health care, reduce risks, improve customer satisfaction and to fulfil the role of the national reference centre.

In accordance with the "Health Organization Development Program" (the 228th order of Minister of Health and Sports, Mongolia dated in 2013) the **"NCMCH development program (2013-2018 year)"** was developed and approved with 5 goals and 83 performance indicators in order to solve priority challenges.

NCMCH has started to **partially or fully meet the definite criteria** of the JCI Accreditation. The centre has initiated efforts to receive JCI accreditation in the Emergency care, Reanimation and Intensive care, Laboratory diagnostics, Polyclinic services for maternal, child and surgical cares, Infertility and Andrology services and Hospital Management fields. Within this works, we developed and updated the **"Clinical risks reduction and management plan"** and the **"Health care quality assurance program"**.

The **"NCMCH health care quality assurance program"** is updated and approved by MOHS in March 2015. The program is being implemented from 12th March 2015 to 1st December 2018 (4 years). The updated program has 5 goals including "reducing morbidity and mortality by improving the quality of specialized care for maternal and child health care and to avoid clinical risks".

IV. NEW TECHNOLOGY AND PROJECT MANAGEMENT

4.1. About the new diagnostic and treatment technologies and equipment

NCMCH aims to strengthen diagnostic and treatment capacity, to reduce clinical risks and to improve the quality of medical care, patient safety and customer

satisfaction. Therefore, following equipment and technologies need to be introduced for reducing maternal and child morbidity and mortality.

4.2. Project management and process

In relation to the new equipment installation, re-planning and management of certain services are planned.

Under the project plan, plan-drawings of the certain equipment rooms (such as MRI and 2 simulation centre rooms) will prepare and this shall ensure the necessary infrastructure, electricity and ventilation systems.

Within the scope of the project, the project supplier side shall be fully responsible for the procurement and installation of the medical equipment and its infrastructure according to the plan-drawings including: transportation of the equipment, placement and installation of the equipment in rooms with the entire necessary infrastructure, providing short-term training for relevant doctors, and technicians in the workplace.

№	Equipments	Quantity
1.	MRI (with renovation of an installation room)	1
2.	Establishing the Diagnostic Imaging Picture Archiving and Communication System (DI/PACS). Connecting all subspecialty departments into the system. Server room, image storing system, image transfer system etc.,	1 Complex system
3.	Patient controlling cardiomonitors (neonatal – 20, pediatric – 25, adults – 15)	60
4.	Continuous cardiotocographic monitoring system for fetal assessment during labor	30
5.	Centralized patient monitoring system (OB-GY Hospital - ICU, Anesthesia Department, Children's Hospital – Surgical ICU, Anesthesia Department, Neonatology, Neonatal Pathology and Emergency Departments)	7
6.	For OB-GYN diagnostic purposes: Static (6) and Portable (4) ultrasound machines with advanced capacities	10
7.	For Pediatric diagnostic purposes: Static (6) and Portable (4) ultrasound machines with advanced capacities	10
8.	Additional probes and softwares of ultrasound machines (cardiac, vaginal, renal biopsy etc)	5
9.	Establishing pediatric cardiac surgery capacity. Delivering and installation of complex equipments including by-pass mashine, ventilator, anesthesia mashine; portable ultrasound, portable ABG, portable hematological analyzer. Civil work of the operating theatre for heart surgery.	1 Complex system
10.	Pediatric clinical simulation training center (with renovation works of an installation room)	1
11.	OB-GYN clinical simulation training center (with renovation works of an installation room)	1
12.	Medical electronic lockers for medicines and supplies, system. (Subspecialty departments-28, 2 outpatient clinics, Adolescent clinic, Infertility center, Medical cytogenetics, Laboratory-11; IT system, server)	44
13.	Kidney, liver, lung, heart, colon-rectal biopsy lab-examination technology and equipment sets (for Central laboratory)	1 Complex
14.	An automatic machine for Gram staining (for Central laboratory)	1
15.	Automated bacteriological analyzer (+antibiotic sensitivity)	1
16.	Immunohistochemical analysis kits (for Central laboratory)	1

17.	Installation of the new additional software into previously supplied hearing audiometer ASSR	1
18.	Automatic IV syringe pump	500
19.	Installation of the video camera on the operating lights (lights which are previously supplied and installed)	7
20.	Sequence machine (for defining of nucleod sequence)	1
21.	Laser surgical apparatus (for obstetrics and gynecology, fetal surgery, infertility intervention)	1
22.	Oxygen alarm and monitoring system (PICU, Surg ICU, Obg ICU, NICU, Anesthesia Dep-2, Neonatal pathology)	7
23.	Cancer surgery apparatus Quso (for liver surgery)	1
24.	Hospital internal calling system	1
25.	Facial nerve monitor	1
26.	Training	35 staff

Performance / management

Regarding the installation of new medical equipment to ensure a central coordination and creation of the necessary infrastructures, a meeting and discussion with architects, civil, mechanical and electrical and information technology engineers and equipment consultants will be organised. Also this meeting and discussion will prevent any mistakes and failures the project implementation process and procured medical equipment and will monitor progress, installation and procurement process and the quality control. The planned activities aim:

- To test and analyse provided medical and other equipment;
- To conduct the training on proper usage of medical equipment in workplace;
- To hand users the technical documents and design of medical equipment usage;
- Within the guarantee period, to develop a comprehensive program for maintenance service of equipment;
- To control and manage maintenance service during and after the guarantee period.

Reliable operation and maintenance of equipment

- **Planned preventive maintenance service** - Planned maintenance service or preventive maintenance service is an integral part of the general maintenance works includes scheduled testing, settings, small repairment, oiling, replacement of wear-out parts, make notes of its performance and report position productivity, efficiency, and timing.
- **Broken and defects in service** - Regular equipment maintenance and repairing defects on time is important for the normal operation of medical care. For urgent cases, resources for spare are compulsory.
- **Scheduled control check** - Scheduled control is the evaluation process of monitoring rooms and the operation of the equipment by reviewing the main criteria in the checklists.
- **Technical usage advice** - To organize certain training on normal operation, maintenance and security of equipment for new staff.

Training of doctors, medical specialists and bio-engineers

The specific training is accompanied with major directions of the project to introduce NCMCH's equipment upgrade, new medical technology to maternal and child health care services and to improve the clinical management.

Since NCMCH is the key tertiary level diagnostic and treatment center, the nation's leading doctors and specialists provide services at the centre. Thus, there are fewer opportunities to train them locally. Therefore, the training is scheduled in developed countries' prestigious universities and hospitals.

Trained doctors and specialists will organize training on what they learned and experienced for remaining doctors of NCMCH in the workplace, if possible they will cooperate with visiting experts. Certain training will be organised in order to introduce locally on on-site installation of the new equipment.

To ensure proper and sustainable usage of the equipment or facilities the non-medical professionals such as bio-engineers and technicians shall be trained.

Specialists that involved in the abroad training will be selected using the selection criteria which are based on their working experiences; and close handed doctors and workers will be involved first.

Training will be continued up to 3 months. Conclusive results from the training will be prepared doctors' and experts' teams with ability of providing balanced and qualified activity of reformed equipments.

Training needs	Number of trainees (doctors and medical professionals)		Estimated budget (in euro)
Hospital management	6	1	
MRI	2	1	
Pediatric surgery	2	1	
Pediatrics	2	1	
OB-GY surgery	2	1	
Ob-GY	2	1	
Neonatology	2	-	
Pediatric intensive care	2	-	
Anesthesiology	2	-	
Facs canto method for cancer diagnosis	1	1	
Biopsy and pathology	2	1	
Medical equipment and utility service and repairs	2	-	
Total	27	8	

EXPECTED OUTPUT OF THE PROJECT

The strengthened diagnostic and treatment capacity of National Center for Maternal and Child Health (NCMCH) will lead to enhanced quality and availability of tertiary level referral health care services for women, mothers and children of the country.

EXPECTED OUTCOMES OF THE PROJECTS

- Strategic goals and objectives of NCMCH will be fulfilled. Hence the center's diagnostic; treatment, training and research capacity, quality and efficiencies will be improved.
- Modern and advanced technology of diagnosis and treatments (such as MRI, high performance ultrasonic diagnostics, biopsy/pathologic diagnostic technology, diagnostic imaging e-PACS system and technology of continuous treatment of critical patients etc) will be introduced in healthcare services of obstetrics and gynecology (OB-GYN), pediatrics and pediatric surgery.
- The quality of clinical training and the clinical performance of paediatricians, OB-GYNs and medical professionals will be improved through enhanced favourable simulation conditions.
- Electronic distribution and control system of medicines and medical supplies will be built.
- NCMCH will be able to provide professional tertiary healthcare services for Mongolian mothers, women and children according to world standards. Furthermore, the maternal and child mortality rates will be reduced, and the Sustainable Development Goals accomplishment will be expected.