



JARGALAN PROJECT FINAL REPORT

Oddariya Foundation

Ulaanbaatar, Mongolia

April, 2024

ABOUT THIS REPORT

This report summarizes Jargalan project activities implemented by Oddariya Foundation (2023-2024).

Project name	Jargalan project
Project period	Feb 2023 – Apr 2024
Implementing organization:	Oddariya Foundation
Location:	Ulaanbaatar, Mongolia
Funder:	Novartis Foundation
Area:	Essential Hypertension, Diabetes Mellitus, Dyslipidemia
Key purpose:	To improve the management of some chronic diseases in FGPs
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List of Acronyms

CHD	Center for Health Development
DM	Diabetes Mellitus
FB	Facebook
FPGs	Family Practice Groups
HCP	Health care professionals
HDL	High density lipoprotein
LDL	Low density lipoprotein
MH DU	Municipal Health Department of Ulaanbaatar
MNUMS	Mongolian National University of Medical Sciences
MOH	Ministry of Health
NCDs	Non-communicable diseases
T2DM	Type 2 Diabetes Mellitus
WHO	World Health Organization

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Project overview

Background

In Mongolia, primary care services are primarily delivered through Family Practice Groups (FPGs). These centers, voluntary registered private sector health organizations, operate under government contracts to provide essential primary healthcare services to the population. However, despite their crucial role, there are several challenges that impede their effectiveness.

One notable challenge is the tendency of individuals with chronic conditions such as essential hypertension, diabetes mellitus (DM) and dyslipidemia to bypass primary care and seek treatment directly from secondary care facilities like referral hospitals. This practice not only strains hospital resources but also undermines the quality of healthcare delivery across the country.

Compounding this issue is the frequent employment of inexperienced, recently graduated doctors at FPGs. This compromises the quality of diagnosis and treatment, further exacerbating the burden on referral hospitals and delaying effective medical care for citizens, thereby increasing the risk of worsening their conditions.

According to the 2022 "Health Indicators" report by the Center for Health Development (CHD), Mongolia has a total of 207 FPGs, with 131 located in Ulaanbaatar city and 76 in the provinces. Despite a total of 63,340 doctors and healthcare professionals (HCPs) nationwide, only 3,614 of them are currently employed in FPGs and *soum*¹ hospitals. Medical professionals often perceive FPGs as either a reluctant stepping stone or a last resort for newly graduated doctors to gain some experience, viewing them as a temporary means to advance to the next level of their careers. Typically, they seek to move on as soon as possible, preferring not to remain in such positions for an extended period.

Studies conducted by organizations like the World Health Organisation (WHO), Ministry of Health (MOH), Mongolian National University of Medical Science (MNUMS) School of Public Health, have highlighted various shortcomings within Mongolian FPGs. These include inadequate equipment and testing materials, limited opportunities for professional development and on-the-job training, and a high turnover rate among FPG family doctors. Furthermore, the absence of an "Integrated care model" leads to poor coordination between FPGs and referral health institutions, particularly concerning the management of chronic diseases like essential hypertension, DM and dyslipidemia, which are prevalent among Mongolian citizens.

According to the Mongolia Fourth National Survey of Non-Communicable Disease (NCD) Risk Factors, the prevalence of essential hypertension, DM, and dyslipidemia is alarmingly high in the population. For instance, hypertension affects 44% of individuals aged 15-69, while DM prevalence stands at 8.3% and dyslipidemia at 23%. These figures underscore the urgent need for improved healthcare strategies.

In Mongolia, the prevalence of hypertension varies significantly depending on the diagnostic criteria applied. When the standard blood pressure threshold is set at 140/90 mmHg, the prevalence is reported to be 25.6%. However, this figure rises to 46.5% when the threshold is lowered to 130/80 mmHg, indicating a substantial portion of the population with elevated blood pressure levels.

Similarly, the prevalence of type 2 diabetes mellitus (T2DM) among individuals over 35 years old stands at 10%, according to a study conducted by D. Angar et al. in 2019. Furthermore, estimates from the

¹ Soum – a rural administrative unit in Mongolia, equivalent to sub-province unit

International Diabetes Association suggest that approximately 5% of Mongolians aged 20-79, equivalent to 99.3% of 1000 individuals within this age group, are at risk of developing diabetes. Alarmingly, this condition contributes to an estimated annual mortality of 1,330 individuals in Mongolia.

Moreover, the burden of undiagnosed cases exacerbates the situation, with 71.3 undiagnosed cases of diabetes per 1000 individuals aged 20-79. Such statistics underscore the urgent need for holistic healthcare interventions and improved screening programs to identify and manage these conditions effectively.

A concerning aspect of hypertension management is the high rate of medication non-compliance among diagnosed patients. Research indicates that 68.3% of patients aged 35-64 with an essential hypertension diagnosis fail to adhere to prescribed medications.

Moreover, patient non-compliance with prescribed medication and follow-up visits, coupled with inadequate health education, exacerbates the challenge. The prevalence of undiagnosed cases further complicates the situation, leading to increased morbidity and mortality rates.

In 2022, the Oddariya Foundation conducted a survey aimed at identifying the challenges encountered by both healthcare providers and patients, elucidating their respective needs, and evaluating the efficacy of previous interventions. The survey involved interviews with 17 FPG doctors, 5 referral hospital doctors, and patient representatives.

The survey findings revealed that while clinical guidelines and manuals are available, they are underutilized in practice. This underutilization stems from a lack of training and events focused on enhancing clinical skills and implementing guidelines within the workplace. Furthermore, existing manuals, guidelines, and clinical instructions were criticized for being overly generic and repetitive in content, failing to adequately reflect the unique characteristics of Mongolia's environment, lifestyle, and patient behavior. Consequently, these resources were not widely embraced by healthcare professionals.

To address these shortcomings, it is imperative to update these documents to incorporate pertinent suggestions and requests. By doing so, we can enhance their relevance and utility, thereby increasing their availability and effectiveness in improving healthcare delivery across Mongolia.

Addressing these issues requires a multifaceted approach. Firstly, there is a need to enhance the skills and capabilities of family doctors through continuous training and professional development opportunities tailored to the Mongolian context. Additionally, updating clinical guidelines and manuals to reflect local conditions and patient behaviors is essential for their effective implementation.

Furthermore, efforts should be made to strengthen coordination between healthcare providers and establish a robust incentive system to attract and retain skilled personnel at FPGs. Emphasizing patient education and promoting healthier lifestyles are also critical components of any comprehensive healthcare strategy.

In conclusion, while FPGs play a vital role in Mongolia's healthcare system, there are currently various challenges that undermine their effectiveness. Addressing these challenges requires concerted efforts from policymakers, healthcare professionals, and the community at large to ensure equitable access to quality healthcare for all citizens.

Summary of key activities

Throughout our initiative, we undertook a series of targeted activities to address above-mentioned healthcare challenges, focusing on capacity building, training, mentorship, and patient education. Here's an overview:

1. **Capacity Building for FPG Doctors:** We prioritized enhancing the skills and knowledge of FPGs doctors through specialized training sessions.
2. **Development of Training Modules and Digital Databases:** Recognizing the importance of accessible resources, we created tailored training materials and electronic databases specifically designed for healthcare professionals, particularly those in FPGs.
3. **Mentorship Program:** To foster continuous learning and professional growth, we implemented a mentorship program, enabling FPG doctors to engage with experienced mentors, exchange clinical insights, and enhance their clinical proficiency.
4. **Patient Education:** A crucial aspect of our efforts involved empowering patients through targeted health education initiatives, ensuring they possess the necessary knowledge to manage their health effectively.

Project key milestones include following achievements.

Key milestones of the project

- Jargalan project started: 2023 February
- Jargalan FB page launched: 2023 March
- Mentorship program started: 2023 April
- Training for the healthcare professionals launched: 2023 April
- HCP.mn page launched: 2023 May
- “Jargalan by Oddariya” application launched: 2023 July- September
- Patient education started: 2023 September
- Permission to Credit training from the CHD: 2023 November
- Pocket primary care book published: 2024 November

Our mentorship program engaged 122 FPG doctors, enabling them to acquire clinical skills in managing prevalent non-communicable diseases (NCDs) through hands-on experience in referral hospitals. In addition to conducting clinical examinations with mentors, discussing clinical cases, providing health education to the public, and participating in activities, they were also included in personal development and professional trainings.

Moreover, a total of 1,757 (target 1,600) HCPs benefited from in-person and online training, bolstering their knowledge of NCDs care management, with performance indicators tracked through knowledge assessments. HCPs were provided with comprehensive knowledge on care services for chronic NCDs, and performance indicators were measured by the results of pre- and post-training knowledge test. As much as possible, we tried to include the doctors who were newly employed at the FPGs in these courses, and the electronic training, training content, and examination materials were made available nationwide online.

We established the www.HCP.mn online capacity building platform, with 206 currently registered doctors and over 5,000 users accessing the website for valuable professional development information and resources. This platform is designed to cater not only to FPG doctors but to all HCPs, promoting continuous

learning and knowledge sharing within the healthcare community. We remain committed to promoting this platform to further increase its utilization among healthcare professionals nationwide.

As part of our project, we distributed health education materials to households and hospitals nationwide and collaborated with 50% of Ulaanbaatar City's FPGs to integrate these materials into their practices. Additionally, we provided comprehensive training for FPG family doctors, including evaluation through pre- and post-training assessments. Furthermore, an internationally acclaimed book on diagnosing, treating, and preventing common diseases, translated into Mongolian, was made available to FPG doctors.

In an effort to enhance public awareness, we organized public awareness campaign reaching over 961,831 individuals, surpassing our target. Additionally, 764 patients received targeted health education sessions on hypertension, DM, and dyslipidemia, leading to improved understanding and management of these conditions. According to pre and post training knowledge test results, these patients' general knowledge was increased by 20% (by percentage of correct answers to key knowledge questions). Knowledge about diabetes increased by 25%, hypertension increased by 31% and dyslipidemia increased by 14%.

To facilitate self-monitoring and remote communication between doctors and patients, we developed the "Jargalan by Oddariya" application, which has been utilized by 3,531 citizens, exceeding our target. Moreover, FPG doctors in Ulaanbaatar are utilizing this application to monitor NCDs among their patients. Furthermore, despite the relatively short period of time spent using the app, key clinical outcome of three diseases for 204 active users on the app has improved significantly. (Hba1C, LDL, cholesterol, triglycerides).

Key performance indicators

Table 1: Project key performance indicators

Outcomes/Outputs			Indicator	End of Project target	Current progress	Status
1. Increased knowledge and skills of HCPs on 3 diseases	1.1 Nationwide capacity building by conducting in-person and virtual training.	1.1.1	Number of HCPs and nurses trained online and in-person	1,600	685	Achieved
	Develop simple service delivery training for current guidelines for hypertension, diabetes, and dyslipidemia for primary healthcare centers throughout Mongolia (in collaboration with professional societies).				1,072	
	1.2 Improve nationwide capacity to provide care for NCDs via development of HCP networks and the creation of mentoring and guided practice sessions to improve the efficiency of care for people with hypertension, diabetes, and dyslipidemia.	1.2.1	Mongolian translation of UpToDate for the 3 diseases.	12	12	Achieved
		1.2.2	10 modules for 3 diseases for newly recruited HCPs	10	15	Achieved
		1.2.3	Production of 15 educational pieces of content (videos, posters, and articles) on 3 diseases for HCPs	15	20	Achieved
		1.2.4	Overall 120 mentees. 4 rounds of educational sessions with 30 HCPs in each round.	120	122	Achieved
		1.2.5	4 face-to-face case discussions between mentees and mentors and 8 virtual case discussions between mentees and mentors	12	12	Achieved
	Prepare simple guidelines with paper format	1.2.7	at least 1000 copy of Pocket Primary Care books Mongolian translation	16 chapters	16	Achieved

Outcomes/Outputs			Indicator	End of Project target	Current progress	Status
2. Improve patient knowledge. Increase drug adherence and follow up rate.	2.1 Educate the general public and mobilize patients to increase access to high-quality, affordable medicines and health services.	2.1.1	Increase patient awareness and education on 3 diseases	reach at least 300,000 people	961,831	Achieved
				prepare 35 educational pieces of content	34	
		2.1.2	Number of people/patients who participated (surveyed)	600 survey participants	764	Achieved
	2.1.3	Percentage of people/patients who reported increased awareness	increase awareness by 25% from the baseline	20%	Achieved	
	A second patient digital platform will be implemented, consisting of a main website/app for knowledge exchange and learning spaces.	2.2.1	Digital platform (website total viewers)	additional task	2,496	Achieved
		2.2.2	Number page likes and followers	14000	21,372	Achieved
		2.2.3	Number of application users	at least 3000 users	3,631	Achieved
	3.1 # of patients with diagnosis of diabetes, essential hypertension, and dyslipidemia at FPGs/primary care level/ of 120 mentees' in 2023	3.1.1	Number of patients with diagnosis of diabetes - among app users	0	505	Achieved
		3.1.2	Number of patients with diagnosis of hypertension - among app users	0	984	
3.1.3		Number of patients with diagnosis of dyslipidemia - among app users	0	316		
3. Increase in rates of diagnosis for hypertension,	3.2 Total number of patients with 3 diseases of all mentees post mentorship	3.2.1	Number of patients newly diagnosed patients with diabetes by the mentees	NA	1,334	

Outcomes/Outputs			Indicator	End of Project target	Current progress	Status
diabetes, and dyslipidemia at FPGs/primary care level		3.2.2	Number of patients newly diagnosed patients with hypertension by the mentees	NA	1,520	
		3.2.3	Number of patients newly diagnosed patients with dyslipidemia by the mentees	NA	1,096	
Clinical outcomes of a subset of patients will be tracked to assess the impact on disease management and patient outcomes	3.3 Average clinical outcome of app users with key clinical quality indicators, mmol/L	3.3.1	Hba1C (Normal range ≤ 5.7)	8.58	8.10	Improved
		3.3.2	HDL (Normal range $1.0 < x < 1.6$)	1.86	1.60	
		3.3.3	LDL (Normal range ≤ 3.3)	3.07	2.70	Improved
		3.3.4	Cholesterol (Normal range ≤ 5.2)	5.22	4.93	Improved
		3.3.5	Triglycerides (Normal range ≤ 1.7)	2.37	2.14	Improved
Mentorship program outcomes	3.4 Knowledge increase in mentees through mentorship program	3.4.1	Change in personal development scores via self-assessment pre- post training	NA	+51%	Improved
		3.4.2	Change in knowledge about diabetes through HEARTS-D training	NA	+45%	Improved
Behavior changes in disease management Reduction of complication-related patient hospitalizations	3.5 Measurement frequency during the follow-up period was categorized as never (never measured) or irregular (measured less frequently than application register)	3.5.1	Good management - Number of users who were under doctor supervision	0	2,226	
		3.5.2	Better management - Number of users who had at least one follow-up visits	0	1,544	
		3.5.3	Number of app users who recorded their glucose level independently at least once via app	0	840	

Outcomes/Outputs			Indicator	End of Project target	Current progress	Status
		3.5.4	Good management - Number of users who had two follow-up visits	0	204	
Increased knowledge among patient education program participants	3.6 Percentage of knowledge gain by pre- and post- test results – three diseases	3.6.1	Percentage of knowledge gain about diabetes	NA	25%	
		3.6.2	Percentage of knowledge gain about hypertension	NA	31%	
		3.6.3	Percentage of knowledge gain about dyslipidemia	NA	14%	

Main activities and result

In this chapter, we provide a comprehensive overview of the activities undertaken as part of the project, outlining the activities implemented within the framework of the Jargalan project and present the results in detail.

1. Capacity building of FPG’s family doctors

1.1 Mentorship program

As part of the mentorship sub-program within the Jargalan project framework, a concerted effort was made to empower FPG family doctors by enhancing their clinical skills and providing them with up-to-date diagnostic and treatment information. A total of 42 experienced mentor doctors collaborated closely with 122 mentees from FPGs over a period of three months each.

Throughout the project duration, mentees underwent comprehensive training aimed at equipping them with the knowledge and expertise needed to deliver optimal care and services in the management of hypertension, T2DM, and dyslipidemia. Additionally, mentees were guided on how to effectively manage challenging clinical cases, thereby enhancing their ability to address complex medical scenarios confidently and competently.

Table 2: Mentorship program timeline, by each cohort in months

	2023										2024		
	4	5	6	7	8	9	10	11	12	1	2	3	
1 st cohort													
2 nd cohort													
3 rd cohort													
4 th cohort													

Mentors

The selection of mentor doctors for the program adhered to rigorous criteria, ensuring their expertise and suitability for guiding mentees effectively. The criteria included:

- Specialization in endocrinology or cardiology.
- Employment at a referral hospital.
- Minimum of 5 years of experience as a specialist in referral hospitals.
- Possession of academic and professional credentials.

A total of 42 mentor doctors were chosen based on these criteria, comprising 27 endocrinologists, 14 cardiologists, and 1 doctor from the Department of Family Medicine of the MNUMS. Among these mentors, 86% were affiliated with public hospitals, while the remaining 14% were from private hospitals. The mentors boasted extensive experience ranging from 6 to 30 years, with 95% holding academic or professional degrees.

For further details regarding the mentor doctors, please refer to the appendix of the report for comprehensive information.

Mentees

Participation in the mentorship program was based on both voluntary interest from mentee FPGs doctors and recommendations from the Municipal Health Department (MHD) of Ulaanbaatar and the Mongolian Association of Family Medicine Specialists (MAFMS). A total of 122 doctors from 99 FPGs, representing 72% of all FPGs in Ulaanbaatar across 8 districts, took part in the mentorship initiative. An estimated total of 840,403 people are served by these FPGs. These FPG doctors brought a range of experience to the program, with tenure spanning from 6 days to 23 years in their respective roles.

Table 3: Number of mentees, by district

District	Number of mentees	Number of FPGs in each district	Total population served
Bayanzurkh district	33	27	258,062
Bayangol district	19	19	144,105
Chingeltei district	18	11	74,261
Khan-Uul district	17	11	121,626
Sukhbaatar district	16	15	122,239
Songinokhairkhan district	10	10	81,353
Baganuur district	5	3	22,039
Nalaikh district	4	3	16,718
Total	122	99	840,403

During the mentorship program, a team-based approach was adopted, with three mentees assigned to one mentor. Together, they developed a comprehensive plan for their activities over a three-month period and collaborated closely as a cohesive team.

Across four cohorts of the mentorship program, the average attendance rate of mentee doctors was approximately 78%. Attendance was most consistent when official documents were sent to the heads of FPGs. Conversely, attendance was lowest when training sessions and case discussions were scheduled during regular working hours on weekdays.

It's worth noting that many mentee family doctors had limited work experience, with 30% graduating from the Mongolian National University of Medical Sciences (MNUMS) and the remaining 70% from other private institutions. Despite varying educational backgrounds, all participants were committed to improving their clinical skills and enhancing patient care.

This observation underscores the importance of enhancing the quality of education across both public and private medical schools to cultivate a more skilled and competent healthcare workforce. By prioritizing improvements in the curriculum, training methods, and clinical experiences provided by private institutions, we can ensure that graduates from these schools possess the necessary knowledge and skills to deliver high-quality healthcare services. This holistic approach to education reform will contribute to the development of a more capable and proficient healthcare workforce, ultimately benefiting patients and healthcare systems alike.

Mentorship programme

The mentees participated in a total of 22 hours of training, divided into three types:

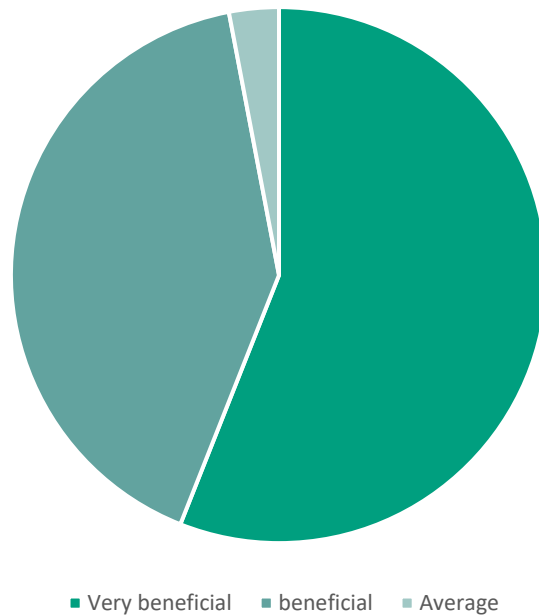
1. "Human Capital" Personal Development Training
2. Essential Care Package Training for Non-Communicable Diseases - HEARTS-D
3. Comprehensive Training to Improve the Management of Hypertension and Dyslipidemia in Adults

For the "Human Capital" personal development course, the attendance rate was 80%, and mentees experienced a remarkable 51% increase in their personal development scores after completing the two training sessions.

The HEARTS-D training, conducted in collaboration with the Mongolian Diabetes Association, saw an attendance rate of 81%. Mentees demonstrated a significant 45% increase in knowledge based on pre- and post-test assessments.

Upon completion of the training programs, mentees were surveyed for feedback. Results indicated that 56% of respondents found the personal development training to be very beneficial overall, 41% found it to be beneficial and 3% found it average, while a staggering 97% acknowledged the importance of the HEARTS-D training specifically.

Figure 1: Mentee's evaluation of personal development training



However, comprehensive training to improve the management of hypertension and dyslipidemia in adults was organized in cooperation with the Association of Chagnuur Specialists. When examining the knowledge level of the doctors who participated in the training with pre- and post-training tests, the knowledge level of mentee doctors who participated in the mentorship program increased by 37 percent (from 37 to 74%), while the knowledge level of non-mentee doctors increased by 16 percent after the same training (from 29% to 45%). According to pre-training test results, mentees were 8% more knowledgeable than non-mentees.

Medical case discussions

As part of the mentorship program, mentors and mentees participated in 12 medical case discussions including 4 in-person and 8 online discussions. The best 12 clinical cases were selected and uploaded to the hcp.mn online platform. During the program, a total of 104 clinical cases were discussed, of which 75% were clinical cases with DM and DM complications.

Image 1: During medical case discussion



Mentees also undertook apprenticeships at their mentors' hospitals, gaining hands-on experience and learning directly in a real-world setting.

According to mentee evaluations at the end of the program, 90 percent rated the clinical discussion in a classroom as excellent, but the rating dropped to 71 percent when it was conducted online. According to this, it is more effective to organize clinical cases in classrooms.

During the 3-month mentorship program, the mentees accompanied the mentor doctors at the referral hospital and performed clinical practice for an average of 4-5 working days (target 10 days). Mentees have completed 498 times 3,891 hours of practical work under the supervision of their mentor doctors in all reference level hospitals.

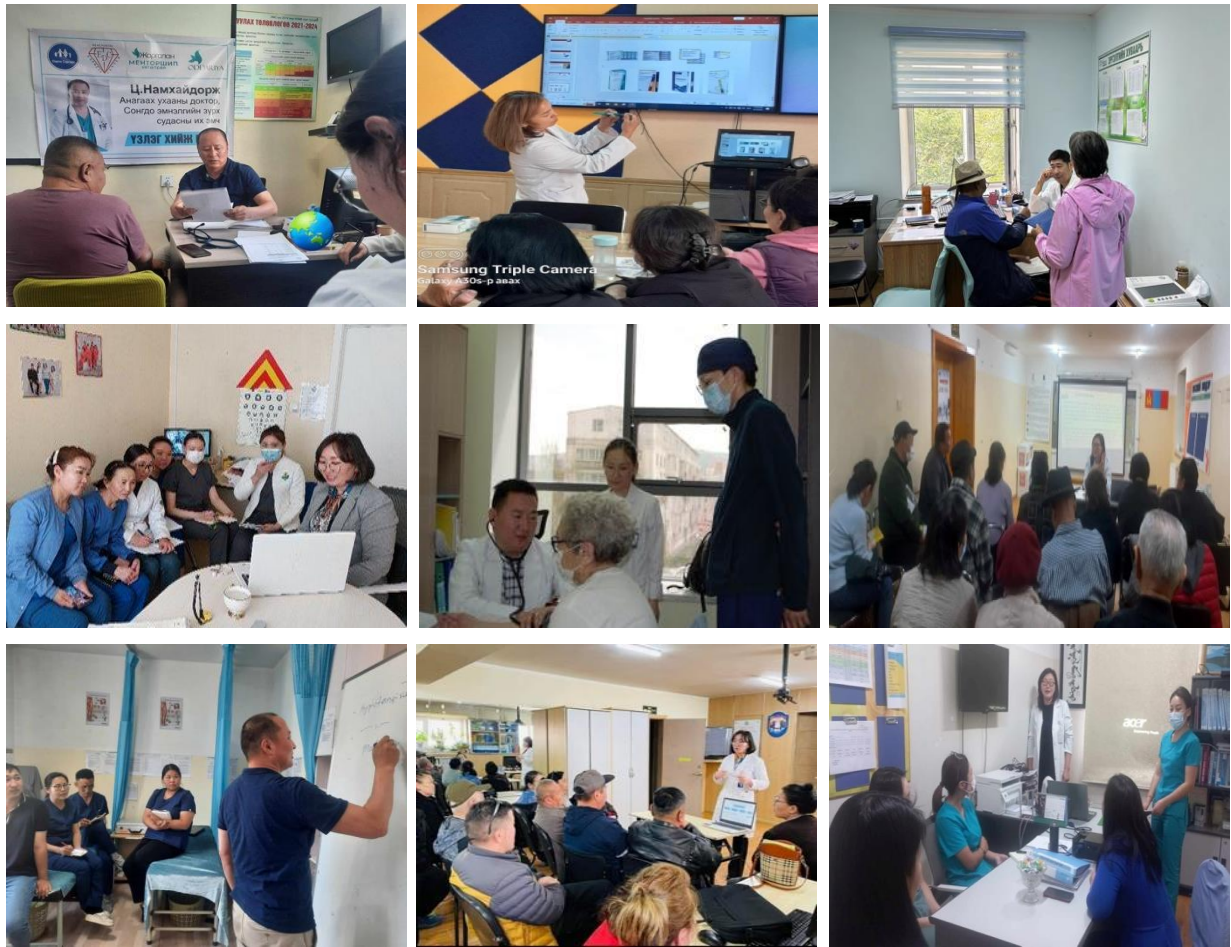
Image 2: Mentee's apprenticeship at mentor's hospitals



They also conducted collaborative check-ups at the mentees' respective FPGs. This not only enhanced the quality of check-ups at FPGs but also provided mentor doctors with insight into the operations of FPGs firsthand, thereby reducing misconceptions among doctors at secondary or tertiary level hospitals regarding the effectiveness and reality of FPGs.

The mentor doctor cooperated with the mentee doctor at the National Medical Center 170 times for 908 hours and examined a total of 7,441 people. Mentors and mentees spent an average of 8.5 hours together at the family clinic. During the joint review, mentees diagnosed 3,950 new diseases, of which 1,520 were cases of hypertension.

Image 3: Mentor and mentee joint check-up at FPGs



It is noteworthy that, beyond the structured mentorship program, mentors and mentees engaged in voluntary collaborations, such as organizing joint events and preparing handouts for citizens. They also participated in the research activities and opened a corner for NCDs at their perspective FPGs.

Image 4: Mentorship team joint events



Image 5: Handout prepared by mentor and mentees for public

Image 6: Check-up corner equipped by mentor and mentees at FPG



Image 7: Information corner prepared by mentor and mentees team



Before this mentorship program, I had limited knowledge on diabetes patients. So, if I encountered patient with diabetes, I would try to send them to secondary hospital as soon as possible. From the program, I learned how to take care of such patient including what to say, how to advise at primary care level. I am very happy to have learned it.

Family doctor

1.2 Digital capacity building platform - HCP.mn website development

To enhance the capabilities of FPG doctors who serve as the cornerstone of healthcare provision in Mongolia, it is imperative to bolster their clinical skills and ensure access to contemporary diagnostic and treatment knowledge. While onsite classroom trainings are valuable, the demanding workload of FPG family doctors often impedes their full participation.

As part of our project, we have established the objective of developing an digital capacity building platform in Mongolian language. This platform is designed to facilitate distance learning, granting FPG family doctors with continuous access to modern information and educational resources. By implementing the digital capacity building platform, we aim to overcome the limitations posed by on-site trainings and enable FPG doctors to engage in ongoing learning and skill development at their own pace and convenience.

The project commenced with a focus on determining system requirements, conducting research on analogous systems, and formulating a general model. Throughout this investigative phase, two systems with comparable functionalities in Mongolia were identified and thoroughly studied:

- a. HR.HDC.gov.mn: Managed by the Center for Health Development (CHD), this system serves as a central platform for health-related data management and administration.
- b. www.chagnuur.mn: Operated by the "Chagnuur Society," an NGO comprised of medical experts, this website provides resources and information pertaining to healthcare practices and initiatives.

By familiarizing ourselves with the operations of these systems, we gained valuable insights into their functionalities and user experiences, which informed the development of our project's model. This research served as a foundation for crafting a tailored digital capacity building platform that addresses the specific needs and challenges faced by all medical professionals working in FPGs.

CHD utilizes the Moodle system for e-learning through its platform, surgalt.hdc.gov.mn. As an autonomous organization responsible for continuous medical professional training in Mongolia, CHD manages tasks such as extending treatment licenses, granting credits, and organizing training sessions. Professional associations and training institutions upload their courses to the website, and upon completion of courses and satisfactory pre- and post-test results, credit hours are awarded accordingly.

On the other hand, chagnuur.mn, operational since 2019, focuses on enhancing the quality and accessibility of refresher training for doctors and medical professionals. Utilizing the Wordpress content management system, this platform facilitates user registration and offers courses for a fee, allowing users to earn credit hours upon course completion.

In line with these initiatives, our project aims to develop a system using an open-source platform that enables scalability and cost-effectiveness. By choosing a widely used international system, we ensure

flexibility for future expansion as user numbers and content volume grow. Development of our system commenced in April 2023 and was successfully completed by June of the same year.

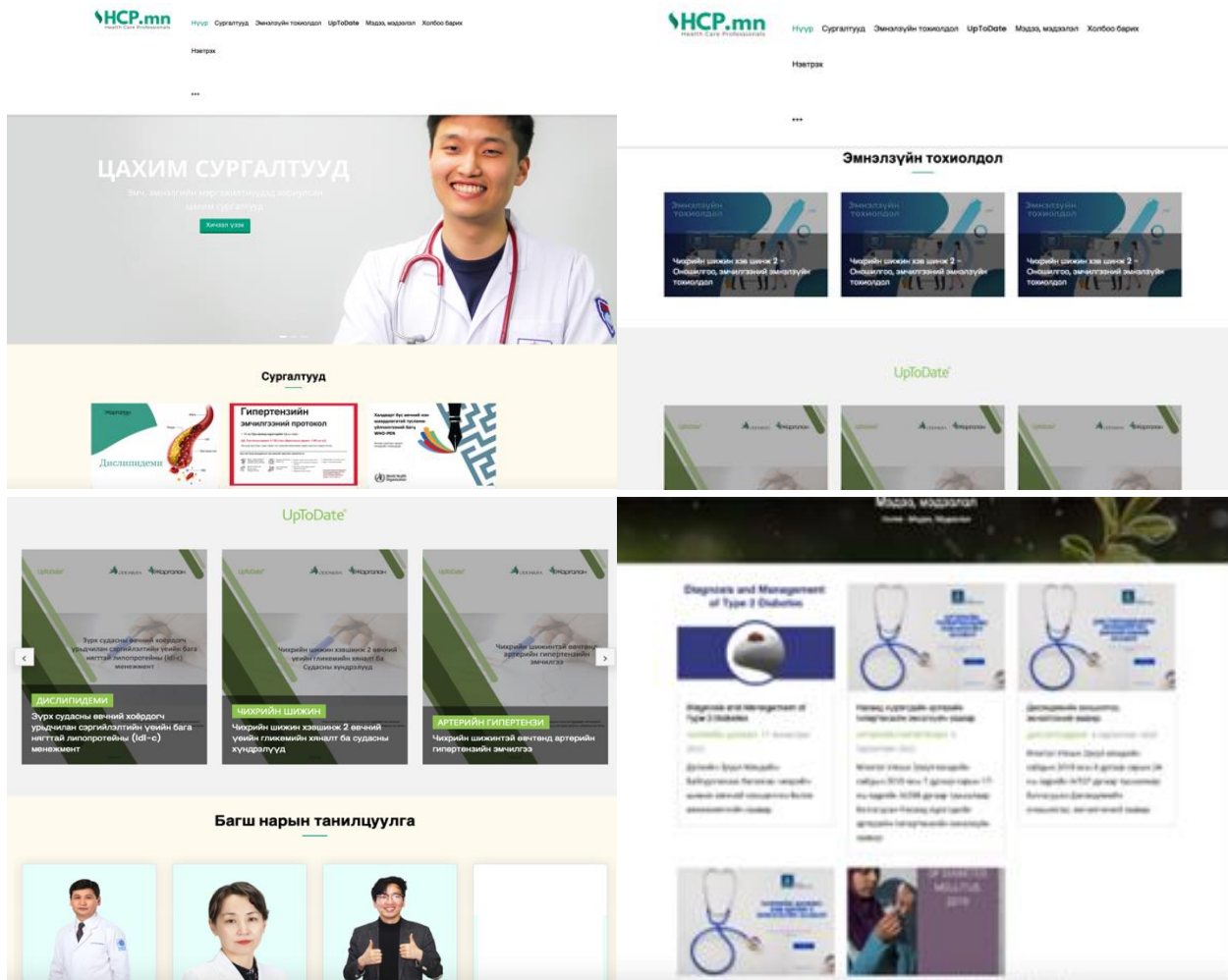
Image 9: Systems used on HCP website platform



Our www.hcp.mn website serves two primary purposes: providing medical professionals with access to e-courses and offering essential information pertinent to their practice. To achieve this, we have established a partnership between two systems for content management and e-learning, employing a combination of Drupal CMS 10 and Moodle LMS 4.1 systems.

E-courses available on our platform are hosted on the Business version of Vimeo.com for a nominal fee. These video courses are exclusively accessible and viewable on our website, ensuring seamless integration with our learning system. By leveraging this combination of content management and learning management systems, we aim to deliver a comprehensive and user-friendly experience for medical professionals seeking ongoing education and information relevant to their field.

Image 10: Website articles



The content available on our digital platform is meticulously curated to cater to the educational needs and professional development of medical professionals. A breakdown of the content categories is included below:

1. Training:

- Essential Care Package for Non-Communicable Diseases - HEARTS-D
- Comprehensive training to enhance the management of hypertension in adults
- Comprehensive training to enhance the management of dyslipidemia in adults
- A collection of 24 concise 20-minute video lessons focusing on nursing care during chronic diseases in primary care. These lessons are organized into training packages, each comprising 6 video lessons accompanied by pre- and post-tests, granting 1 credit upon completion. As of April 2024, 4 training packages are available on the website.

2. Clinical Cases:

- Selected cases from clinical case discussion events tailored for FPGs doctors participating in the mentorship program. These cases encompass a range of scenarios encountered in primary care settings. A total of 12 online and on-site clinical case discussions were

conducted within the mentorship program, and the top 12 cases were chosen to be on the platform.

3. News and Information:

- Modern diagnostic clinical guidelines for hypertension, diabetes mellitus (DM), and dyslipidemia in Mongolia
- Updated classification of chronic diseases endorsed by the World Health Organization (WHO) in 2019
- WHO-approved guidelines for the diagnosis and management of chronic kidney disease, the HEARTS-D protocol, and various other guidelines essential for daily medical practice.

4. UpToDate Guideline:

- Access to UpToDate guidelines, providing medical professionals with current and evidence-based information to inform clinical decision-making.

This comprehensive array of content equips medical professionals with the latest knowledge, guidelines, and practical insights necessary for delivering optimal care in primary healthcare settings.

Throughout the project, we focused on leveraging the UpToDate platform, renowned as the foremost evidence-based clinical resource endorsed by international medical experts and professional associations. We uploaded guidelines in English-Mongolian versions specifically tailored to address hypertension, diabetes mellitus (DM), and dyslipidemia. Moreover, we diligently promoted these guidelines to the public, crafting content authored by experienced, specialized doctors and educators.

Our approach involved meticulous selection of critical topics encompassing diagnosis, treatment, and early detection of hypertension, DM, and dyslipidemia. Subsequently, we undertook the task of translating a total of 12 guidelines into the Mongolian language, ensuring accessibility to vital medical information for healthcare professionals and the wider community. Through these efforts, we aimed to disseminate evidence-based practices and enhance healthcare outcomes in our region.

Table 4: List of translated contents of UpToDate

Content	N ^o	Topics
DM	1	Initial management of hyperglycemia in adults with type 2 diabetes mellitus
	2	Glycemic control and vascular complications of type 2 DM
	3	Treatment of hypertension in patients with diabetes mellitus
	4	Gestational DM: Obstetric issues and management
	5	Early screening of DM
	6	Choice of drug therapy in primary (essential) hypertension
Hypertension	7	Management of severe asymptomatic hypertension (hypertensive urgencies) in adults
	8	Adult hypertension
Dyslipidemia	9	Low-density lipoprotein cholesterol-lowering therapy in the primary prevention of cardiovascular disease

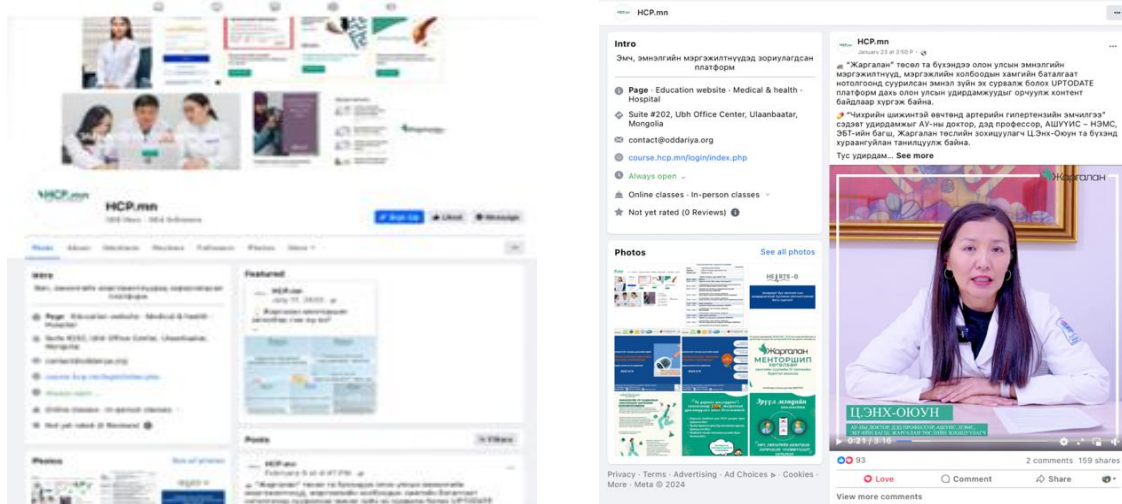
	10	Management of low density lipoprotein cholesterol (LDL-C) in the secondary prevention of cardiovascular disease
	11	Adult obesity
	12	Management of adult hypertriglyceridemia

Throughout the project, we have collaborated extensively with professional societies, associations, referral doctors, professors, and teachers from the Mongolian National University of Medical Sciences (MNUMS) to develop and upload materials, lessons, and content onto our website. In the initial stages of the project, significant efforts were dedicated to website development and content enrichment. However, in the last three months, our focus has shifted towards promoting the website and increasing accessibility.

In terms of website promotion, we leveraged public social channels more effectively, including the establishment of the HCP.mn page on Facebook. Additionally, we created short content snippets derived from our lessons and materials, as well as posters, which were distributed to doctors and medical professionals. Moreover, during classroom training sessions, lecture materials and lessons were disseminated on the website, and the website itself was introduced to member doctors through professional associations.

Our promotion activities will persist until we establish a solid user base, and we will continue to enrich the website with new information, lessons, and guidelines on a regular basis. We are committed to ongoing improvements and enhancements to ensure that our platform remains a valuable resource for medical professionals seeking continuous education and access to updated medical knowledge.

Image 11: HCP Facebook page



The system comprises three distinct user types: admin, moderator, and regular user. The flexibility of the system allows for the addition or modification of user types as required in the future. Admins and moderators are employees of the Oddariya Foundation entrusted with managing the system's operations. They possess the authority to create courses, upload course materials and tests, and regulate access to the platform.

On the other hand, typical users encompass doctors, nurses, and healthcare professionals affiliated with healthcare institutions nationwide. These users gain access to published courses by registering with the system. Through this inclusive approach, we aim to cater to the diverse needs of healthcare professionals across the country, facilitating their ongoing education and professional development.

As of April, 2024 the platform has garnered significant traction, with over 2,000 individuals accessing its resources. The published information has been viewed an impressive 5,000 times, indicating a strong interest and engagement from users.

Within the training system, a total of 206 users are registered, demonstrating a notable level of participation in the platform's educational offerings. Furthermore, the published video lessons have garnered considerable viewership, demonstrating their value as a learning resource.

Image 12: HCP.mn website outreach statistics

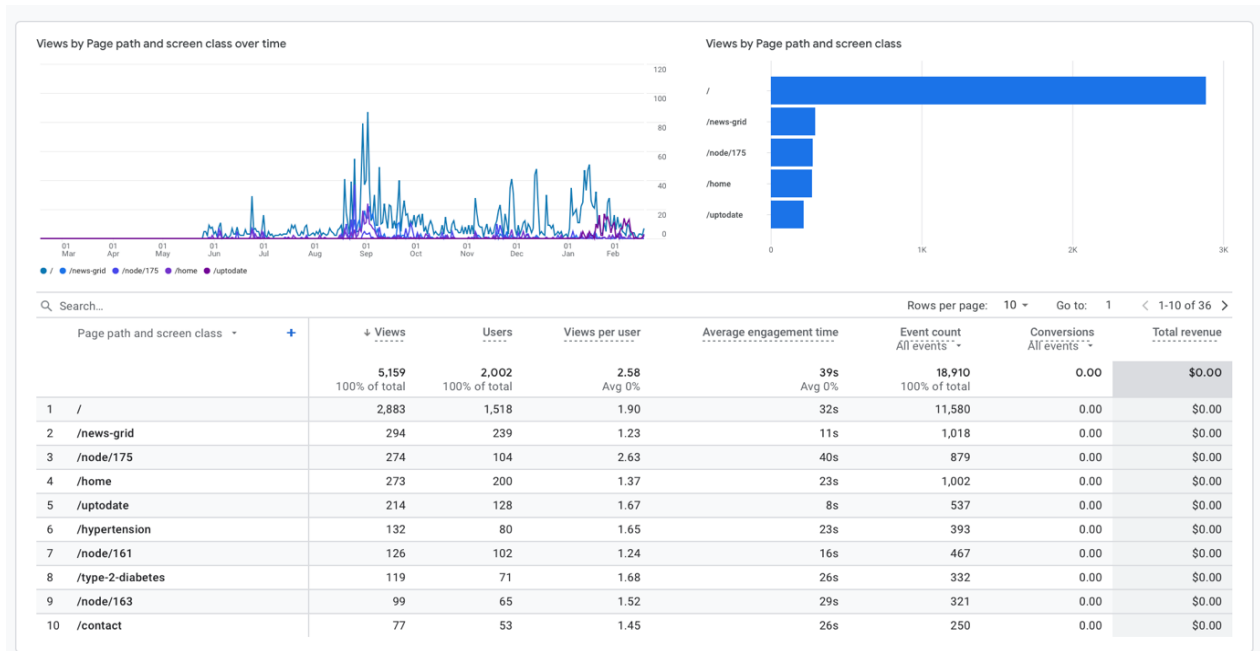
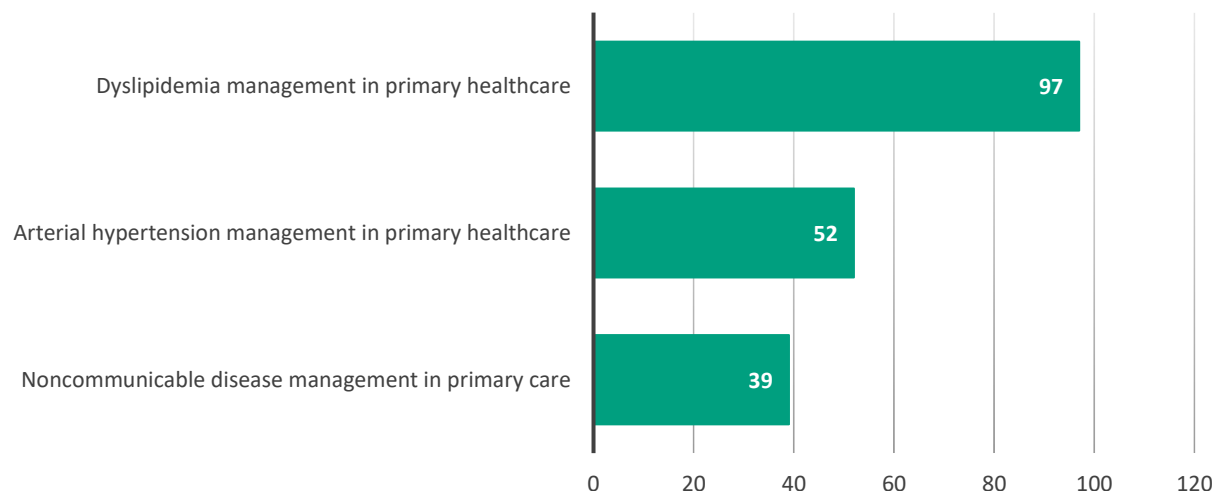


Figure 2: Number of HCP platform user's training, by type of training



The efforts to enrich the website's content have yielded promising results, with 10 video contents presenting translated guidelines from the UpToDate platform being shared on our Facebook page. As of March 2024, 6 videos have garnered a total of 32,637 views, showcasing a strong engagement from our audience. Here's a breakdown of the views for each guideline:

- "Hypertension treatment in patient with DM" guideline: 11,394 views
- "Adult hypertension" guideline: 11,338 views
- "Initial management of hyperglycemia in adults with type 2 diabetes mellitus" guideline: 6,418 views
- "Management of low-density lipoprotein cholesterol (LDL-C) in the secondary prevention of cardiovascular disease" guideline: 1,378 views
- "Low-density lipoprotein cholesterol-lowering therapy in the primary prevention of cardiovascular disease" guideline: 1,378 views
- "Gestational diabetes – Obstetrics issues and management" guideline: 731 views

Looking ahead, we are devising plans to continuously expand and enrich the website's lessons and materials. Our goal is to align website content with the e-learning requirements outlined in the "Organize the short-term training for medical specialists" directive approved by Order No. A/26 of the Minister of Health, Mongolia. In 2024, we aim to seek confirmation from the "Credit training department" of the Center for Health Development (CHD) to officially certify our platform as a credit training platform. This certification would pave the way for our website to become the third official platform offering credits to healthcare professionals through online training across Mongolia by 2024-2025.

Moving forward, we envision sustaining the website's growth by continually adding courses and promoting it among healthcare professionals. To support these efforts, we recognize the need for ongoing employment of training staff by the foundation. To cover the associated costs, we may consider implementing a fee structure for participants or exploring alternative funding sources.

Furthermore, ensuring the system's stability and reliability in the future necessitates addressing several key areas, including resolving domain and hosting payment issues, performing regular security updates, renewing Vimeo membership annually, and collaborating with teachers and experts to develop regular

lessons. Additionally, organizing promotional activities among healthcare professionals at all levels will be crucial for expanding our platform's reach and impact. By prioritizing these initiatives, we aim to maintain the effectiveness and sustainability of our digital training platform for the benefit of healthcare professionals nationwide.

1.3 Training for the healthcare professionals

We initiated comprehensive on-site and online training programs aimed at enhancing the knowledge and skills of FPG doctors and healthcare professionals in addressing hypertension, DM, and dyslipidemia. Our objectives included equipping participants with up-to-date diagnosis and treatment guidelines for hypertensive and metabolic disorders, familiarizing them with the utilization of clinical instructions in hospital settings, and providing insights into nursing methods and essential healthcare services.

To ensure widespread dissemination of information, we organized both classroom-based and online training sessions. Within the scope of these training initiatives, we developed four distinct sets of training modules tailored to the specific needs of healthcare professionals. These modules covered a range of topics relevant to the management of hypertension, DM, and dyslipidemia, incorporating the latest advancements in diagnosis and treatment strategies.

In total, our training programs attracted the participation of 1,757 healthcare professionals, who benefited from a combination of online and on-site training sessions. Through these efforts, we aimed to empower healthcare professionals with the necessary knowledge and skills to effectively address the challenges posed by hypertensive disorders and metabolic conditions in clinical practice.

Table 5: Number of participants, by training types

	Training	Training type	Total
Number of participants	On-site	400	755
	Online	1200	1002
	Total	1600	1,757

The participation in our primary healthcare training programs encompassed professionals from various regions, including the 9 districts of Ulaanbaatar, as well as Khentii and Gobi-Altai provinces. Notably, a significant proportion of our participants—138 individuals—represented rural healthcare professionals.

This diverse representation demonstrates the inclusive nature of our training initiatives, which aimed to reach healthcare professionals across different geographical areas and practice settings. By engaging primary healthcare professionals from both urban and rural regions, we sought to ensure that our training programs addressed the unique challenges and needs encountered in various healthcare contexts. Through this comprehensive approach, we endeavored to empower primary healthcare professionals with the knowledge and skills necessary to deliver high-quality care to their communities, irrespective of their location.

Table 6: Training modules for health care professionals by topics

Training	Content	Training types	Topic
Training module 1	Noncommunicable disease management in primary care	On-site training	1. Overview of Noncommunicable diseases
			2. Type 2 Diabetes in adults: management
			3. Management of hyperglycemia in type 2 diabetes
			4. Management of diabetic dyslipidemia
		Online training	1. Package of essential noncommunicable (PEN) disease interventions for primary health care
			2. Cardiovascular disease risk assessment and management
			3. Use of the HEARTS hypertension treatment protocols
			4. Management of diabetes mellitus type 2
			5. Management of diabetic dyslipidemia
			6. Management of diabetic complications
Training module 2	Arterial hypertension management in primary healthcare	On-site training	1. Prevalence and problems of hypertension in Mongolia
			2. Diagnosis and treatment management of hypertension
			3. Non-pharmacological management of hypertension

Training	Content	Training types	Topic		
			4. Prevention and control of hypertension		
		Online training	1. Measurement and patient monitoring of blood pressure		
			2. Diagnosis of hypertension in primary health care		
			3. Management of arterial hypertension in adults		
			4. Hypertension medication treatment protocol		
			5. Hypertension crises		
			6. Improving hypertension control and early detection		
Training module 3	Dyslipidemia management in primary healthcare	Onsite training	1. Lipid metabolism, classification and causes of lipid and lipoprotein disorders		
			2. Diagnosis and treatment management of dyslipidemia		
			3. Non-pharmacological treatment of dyslipidemia		
			4. Statin therapy for primary prevention of cardiovascular disease		
		Online training	1. Basic concepts and classification of dyslipidemia		
			2. Pathogenesis and complications of dyslipidemia		
			3. Non-pharmacological treatment of dyslipidemia		
			4. Joint dyslipidemia guidelines of the European Society of Heart and European Atherosclerosis Society		
			5. Dyslipidemia guideline recommendations and guideline use in primary care		
			6. Diet and exercise counseling to prevent dyslipidemia		
		Training module 4	Nursing practice for chronic disease management in the primary care	Onsite training	1. Risk factors and early detection of noncommunicable diseases
					2. Patient centered diabetic care
3. Nursing care for patients with hypertension					

Training	Content	Training types	Topic
			4. Nursing care management of diabetes mellitus
		Online training	1. Risk assessment of cardiovascular disease and risk management
			2. Registration and monitoring of Diabetes
			3. Nutrition assessment and medical nutrition therapy for lipid and lipoprotein disorders
			4. Physical activity and nutrition therapy for chronic illness
			5. Strategies for providing effective patient education
			6. Specialized nursing practice for chronic disease management

During the project, each of the four sets of module training was meticulously designed with its own unique methodology, tailored to address the specific learning objectives. In total, nine training sessions were conducted, with seven held in Ulaanbaatar city and two in rural areas.

Module 1: NCD Management in Primary Healthcare. This module focused on delivering theoretical knowledge about NCDs, including hypertension, diabetes mellitus (DM), and dyslipidemia. The training incorporated various interactive elements such as group discussions, practical exercises, and lecture programs. Participants engaged in activities such as risk assessment for DM and cardiovascular diseases (CVD), clinical case studies, and lively Kahoot competitions. Each team was guided by an assigned endocrinologist, who provided support and direction throughout the training. Additionally, individual health assessments were conducted, including measurements of blood pressure, fasting glucose levels, body weight, and BMI calculations. Teams also conducted organizational assessments of their respective FPGs, identifying challenges and discussing potential solutions.

Modules 2-4: Primary Healthcare Management and Nursing Care. These modules featured lectures and clinical case studies tailored to specific subjects. Participants were also introduced to the www.HCP.mn website and the Jargalan application, which served as valuable resources for ongoing education. Refresher training sessions were planned for 3-6 months after the initial training, utilizing the www.HCP.mn platform. Depending on the module, training sessions ranged from 4 to 16 hours in duration.

In adherence to regulatory requirements outlined in Minister of Health Order No.A/337, which governs professional and continuous training, training packages were developed to meet the credit hour requirements set by the Center for Health Development (CHD). Accreditation for the training sessions was obtained in collaboration with the Mongolian Family Medicine Association, and credits were awarded to 587 doctors and healthcare professionals who participated in the training courses organized by the Oddariya Foundation.

In selecting instructors, careful consideration was given to ensuring expertise and proficiency in each field of study. The foundation collaborated with professional associations, committees, and specialist councils to engage qualified teachers and professors to lead the training sessions.

Through these meticulously planned and executed training modules, the Oddarya Foundation aimed to equip primary healthcare professionals with the knowledge and skills necessary to effectively manage NCDs and deliver high-quality care to their communities.

Table 7: Lecturers' information

Training	Teacher	Academic title	Professional position
Noncommunicable disease management in primary care	Altaisaikhan Khasag	Professor, MD (Mongolia), PhD (Japan)	Endocrinologist Professor and consultant physician, Department of Endocrinology, Mongolian National University of Medical Sciences, MNUMS
	Oyuntugs Byambasukh	Associate Professor, MD (Mongolia), PhD (Netherlands)	Endocrinologist Head of the Department of Endocrinology, Mongolian National University of Medical Sciences, MNUMS
Arterial hypertension and dyslipidemia management in primary healthcare	Suvd Nergui	MD (Mongolia), MPH (USA), PhD (Japan)	Cardiologist
	Oyuntugs Byambasukh	Associate Professor, MD (Mongolia), PhD (Netherlands)	Endocrinologist Head of the Department of Endocrinology, Mongolian National University of Medical Sciences, MNUMS
	Bat-Erdene Nyamsuren	MD (Mongolia), MSc (Mongolia)	Cardiologist Lecturer of the Department of Cardiology, Mongolian National University of Medical Sciences, MNUMS
	Dale Schlais	Family practitioner	Family doctor in Milwaukee, USA
Nursing practice for chronic disease management in the primary care	Enkhjargal Yanjmaa	Associate Professor, MD (Mongolia), PhD (Mongolia)	Diabetes Educator Head of the Department of Public health, Nursing school, MNUMS
Type 2 diabetes mellitus management in rural	Chantsaldulam Purevdorj	MD (Mongolia), MSc (Mongolia)	Endocrinologist Doctor of the Department of Endocrinology, First central Hospital of Mongolia Mentorship program officer, Oddariya Foundation
	Oyundari Tumurzurkh	MD (Mongolia), MSc (Mongolia)	Endocrinologist Training officer, Oddariya Foundation

The training sessions were conducted at various venues, each equipped with the necessary facilities to facilitate effective learning. These venues included the lecture hall of the MNUMS, the conference hall of CHD, and the hall of the HUB Innovation Center. Additionally, online training sessions were organized in collaboration with the CHD, utilizing the Zoom platform.

In the capital city, Ulaanbaatar, seven training sessions were held, attracting a substantial number of FPG family doctors and healthcare professionals from all districts. Furthermore, two training sessions were conducted in local areas, specifically in Gobi-Altai province and Khentii province. These sessions provided valuable opportunities for 38 doctors from Gobi-Altai and 100 doctors from Khentii to participate in the training and enhance their knowledge and skills in managing NCDs and delivering quality healthcare services to their communities. These two provinces were selected based on venue availability, alignment with national training plans, and cooperation from local authorities. The project team observed an increasing demand for such training in rural areas.

Image 13: During capacity building training of healthcare professionals



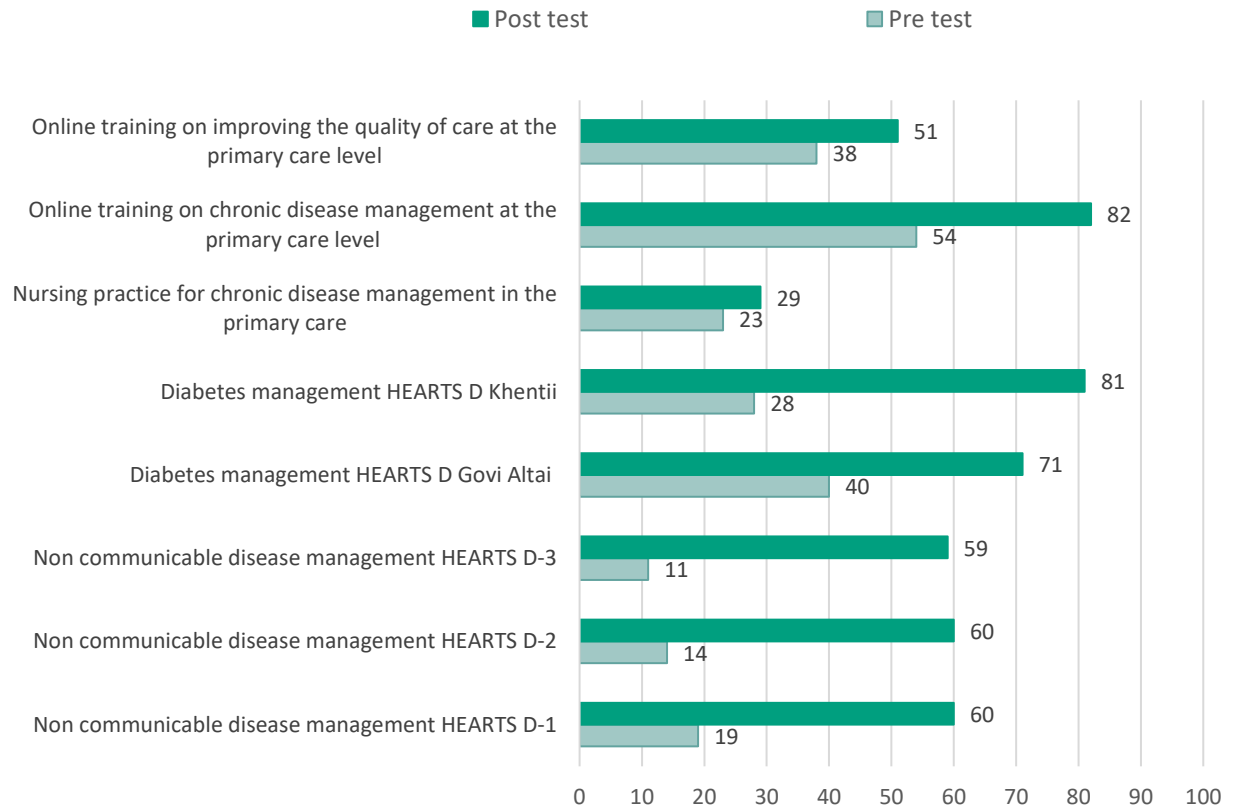
Image 14: Training and events



The evaluation of training outcomes involved administering knowledge tests to participants both before and after the training sessions, allowing for a comparison of their test results. Of the 1,757 doctors and healthcare professionals who participated in the training, 1,450 completed the pre-training test and 1,264 completed the post-training test.

Upon assessing the knowledge of mentees and non-mentees who attended the training, it was found that our mentees exhibited a higher level of understanding than non-mentees. Specifically, the knowledge improvement average rating of mentees increased by 37% (from 37% to 74%), while the average rating of non-mentees increased by only 16% (from 29% to 45%) by pre/post test result. When assessing baseline knowledge on a pre-training test, mentees had 8% more knowledge than non-mentees.

Figure 3: Capacity building pre and post training result, percentage of correct answer



The training activities were systematically evaluated by participants using a comprehensive evaluation form, which utilized a rating scale ranging from 0 to 5. Feedback obtained from previous training evaluations was carefully analyzed and utilized to refine subsequent training activities, aiming to enhance their effectiveness.

Participants provided feedback on various aspects of the training, including the content, relevance to their needs, duration, effectiveness of the lecturers, teaching methods employed, and overall organization of the course. Remarkably, the majority of participants rated these aspects highly, with scores exceeding 4.5 points. However, a small percentage of participants, constituting 6%, rated certain aspects below average, indicating areas for potential improvement.

Among the topics covered, dyslipidemia garnered the highest level of appreciation from doctors. This preference suggests a significant demand for information and guidance on the diagnosis and management of dyslipidemia in their daily practice.

Furthermore, participants were surveyed regarding their future training needs, with a focus on both infectious diseases and NCDs. The responses revealed a desire for training on various topics, including chronic obstructive pulmonary disease, comprehensive management of pediatric diseases, non-medical birth guidelines, and infectious diseases. Additionally, there was a noticeable demand for additional training specifically related to diabetes management within the project framework.

Overall, the feedback obtained from participants serves as valuable input for the continuous improvement and refinement of future training activities, ensuring that they remain responsive to the evolving needs of healthcare professionals.

1.4 Pocket Primary Care

In August 2023, Oddariya Foundation successfully obtained official translation rights of book "Pocket Primary Care, Third Edition" by Curtis R. Chong, MD, PhD, MPhil,. A team of professional doctors meticulously translated the book into Mongolian language, with each leading consultant doctor reviewing the translation. This book has achieved significant success, ranking #5 in Amazon's Family Medicine Best Seller, #12 in Medical Education Best Seller, and #16 in Medical Exam Preparation and Review categories.

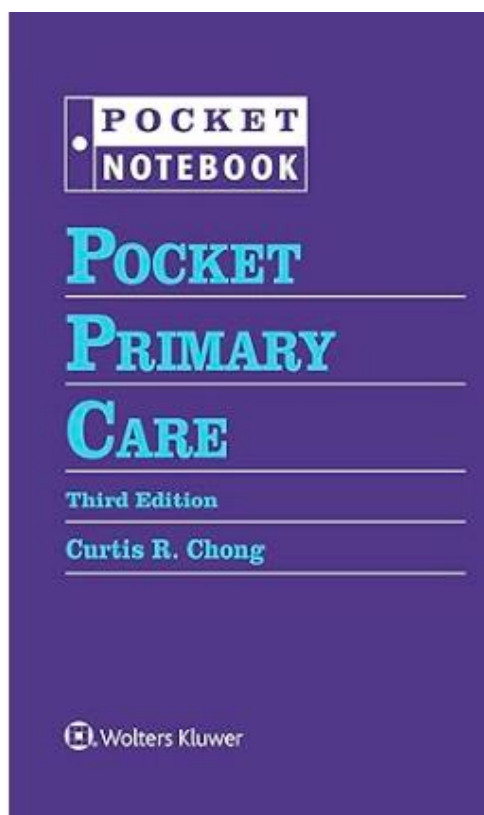
This comprehensive edition encompasses the latest evidence-based clinical guidelines and treatment recommendations, ensuring that family doctors are equipped with the most up-to-date information. It features lists, tables, diagrams, and algorithms summarizing essential knowledge required for accurate diagnosis and treatment planning. Notably, it includes a new chapter on COVID-19 and provides guidance on referrals to family physician specialists.

The content of the pocket book is structured into sixteen chapters covering various medical specialties:

1. General Medicine
2. Cardiology
3. Dermatology
4. Endocrine
5. Gastrointestinal
6. Hematology & Oncology
7. Infectious Disease
8. Musculoskeletal
9. Neurology
10. HEENT (Head, Eyes, Ears, Nose, Throat)
11. Psychiatry
12. Addiction Medicine
13. Pulmonary
14. Renal/Urology
15. Women's Health
16. Men's Health

The Oddarya Foundation plans to publish 1,000 copies of the translated book, titled "Handbook of the Family Physician, Third Edition." Samples of the book will be distributed to 122 mentees who actively participated in the Jargalan mentorship program. Additionally, it will be offered as a bonus to FPG family doctors who demonstrated active engagement with the "Jargalan by Oddariya" application and exhibit exemplary patient monitoring practices. This initiative aims to further enhance the knowledge and skills of healthcare professionals and ultimately improve patient care within the community.

Image 15: Translated manual – English version



2. Public awareness activities for diabetes, hypertension and dyslipidemia

2.1 Patient education training

As part of the Jargalan project's efforts to enhance healthcare accessibility, elevate public health education, and encourage healthy lifestyle choices, multiple training sessions focusing on hypertension, DM, and dyslipidemia were conducted for public education. These sessions aimed to empower individuals with knowledge about these conditions and promote preventive measures through examinations and diagnoses.

Patient education sessions were regularly conducted for patients, with a total of 764 individuals actively participating in these training sessions. These initiatives were designed to equip patients with the necessary information and skills to manage their health effectively and make informed decisions about their well-being. By engaging citizens in these educational activities, the Jargalan project aimed to foster a culture of proactive health management and encourage the adoption of healthy lifestyle practices within the community.

Table 8: Number of participants for patient education sessions

	Date	Number of patients
Pilot test	2023- 9- 4	51
Health day training	2023- 11 -10	122
Mentors training to the patients with DM at referral hospitals	2023 10-12	231
Training of DM trainer at district hospitals	2023 10-12	191

	Date	Number of patients
Mentor, mentee cooperated exam at FPG	2023 12	169
Total		764

The training sessions offered participants fundamental knowledge and insights into recognizing the symptoms and risk factors associated with hypertension, diabetes, and dyslipidemia. Through pre-and-post-training assessments, the impact of these sessions on patients' understanding of these conditions was evaluated.

The results revealed a significant improvement in patients' knowledge following the training:

- Knowledge about diabetes increased by approximately 25 percent.
- Understanding of hypertension improved by 31 percent.
- Awareness regarding dyslipidemia increased by 14 percent.

These findings underscore the effectiveness of the training in enhancing patients' comprehension of these health conditions, thereby empowering them to take proactive measures in managing their health and adopting healthier lifestyles.

Table 9: Contents of patient education sessions

Diabetes mellitus	Arterial hypertension	Dyslipidemia
<ul style="list-style-type: none"> ✓ Symptoms of DM ✓ Risk factors of DM ✓ Complication of DM ✓ Self-control ✓ Doctor's control ✓ Diet of DM 	<ul style="list-style-type: none"> ✓ Etiology of the arterial hypertension ✓ Symptoms of arterial hypertension ✓ Complication of arterial hypertension ✓ Control of arterial hypertension 	<ul style="list-style-type: none"> ✓ Etiology of Dyslipidemia ✓ Classification of Dyslipidemia ✓ Risk factors of Dyslipidemia ✓ Symptoms of Dyslipidemia ✓ Complication of Dyslipidemia ✓ Dyslipidemia зөвлөмж

Patient education initiatives resulted in a notable 20 percent increase in knowledge among participants. Interestingly, training sessions conducted by trainers in referral hospitals and districts exhibited higher levels of improvement compared to other training programs. Conversely, the joint examination of mentors and mentees revealed that the knowledge enhancement from training sessions conducted by family doctors at the FPG was relatively lower, indicating a need for additional continuous capacity-building efforts among FPG doctors to build on key concepts over time and further emphasis on patient education initiatives.

²Table 10: Patient education sessions, pre and post-test and knowledge gain by correct responses

	Pre-test	Post-test	Knowledge gain
Pilot test (AH, DM, dyslipidemia)	35%	54%	19%
DM event training (DM, dyslipidemia)	57%	74%	17%
Central hospital, referral hospital doctors' training (DM)	50%	78%	28%
FPG training (AH, DM, dyslipidemia)	57%	73%	16%
Average	50%	70%	20%

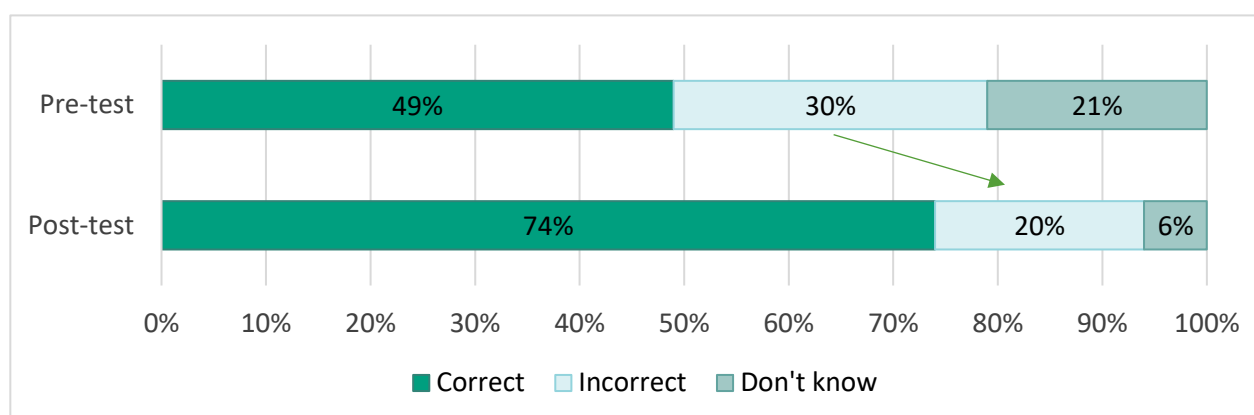
During the training sessions focusing on basic knowledge of diabetes mellitus (DM), participants were educated on various aspects including blood glucose levels, HbA1c (glycated hemoglobin) levels, dietary considerations, and exercise regimens relevant to managing DM. Subsequently, a positive outcome was observed, with participants showing an increase in knowledge ranging from 20 to 31 percent across each chapter covered in the training.

In the pre- and post-training assessments aimed at evaluating general knowledge about diabetes mellitus (DM), participants demonstrated notable improvement. The percentage of correct answers increased from 49 percent to 74 percent. Furthermore, not only did the percentage of incorrect answers decrease, but there was also a decline in the percentage of participants who responded with "I do not know," dropping from 21 percent to 6 percent. This shift indicates that participants were able to acquire fundamental knowledge about DM through the training sessions.

Table 11: Knowledge gain comparison between pre and post-test on DM

	Pre-test	Post-test	Knowledge gain
Knowledge of normal blood glucose levels	45%	65%	20%
Knowledge of normal levels of HbA1c in the blood	52%	78%	27%
Knowledge of the diet of DM	50%	73%	23%
Knowledge of physical activity during DM	48%	79%	31%
Total	49%	74%	25%

Figure 4: Pre and post test result, answers



As for knowledge pre and post training for hypertension increased by 31% from 61% to 92%.

Table 12: Knowledge gain comparison between pre and post-test on hypertension

	Pre-test	Post-test	Knowledge gain
Normal level of the blood pressure	67%	87%	20%
Knowledge about hypertension	44%	91%	47%
Complication of hypertension	71%	93%	22%
Drug use of hypertension	60%	98%	38%
Average	61%	92%	31%

Compared to the general public's awareness of hypertension and diabetes, our project introduced the first comprehensive patient education training for dyslipidemia. While the Mongolian general public had a certain level of understanding about hypertension and diabetes, many encountered the concept of dyslipidemia for the first time through our project.

Many Mongolians lack adequate knowledge about dyslipidemia and the associated risks posed by elevated levels of fats in the blood. While they may have a general understanding that consuming excessive fat is detrimental to health, they often lack insight into the distinctions between good and bad fats. Additionally, there is a prevalent misconception that all types of fats are universally harmful to the body. This highlights a need for comprehensive education on the nuances of dyslipidemia and the importance of distinguishing between different types of fats for overall health.

Table 13: Knowledge gain comparison between pre and post-test on dyslipidemia

	Pre-test	Post test	Knowledge gain
Knowledge about the blood lipids	65%	62%	-3%
Knowledge about the bad cholesterol	22%	44%	22%
Knowledge about food which related to saturated fat	38%	58%	20%
Knowledge about blood lipid increasing complication	40%	55%	15%
Average	41%	55%	14%

Table 14: Paired sample statistic test in pretest vs posttest, DM and Dyslipidemia

	Mean	N	Std. Deviation	Std. Error Mean	Correlation	Sig. P Value
DM pretest	2.23	99	1.260	.127	.336	0.001
DM posttest	2.99	99	1.138	.114		
Dyslipidemia pretest	1.51	99	.962	.097	.199	0.048
Dyslipidemia posttest	2.14	99	1.169	.118		

Moving forward, it is imperative to enhance awareness regarding dyslipidemia by providing comprehensive information about its associated complications and the various types of blood lipids. Emphasizing the importance of preventing these complications through lifestyle modifications and appropriate management strategies will be crucial. By addressing these gaps in knowledge and promoting proactive measures, we can work towards improving overall health outcomes and reducing the burden of dyslipidemia-related complications.

2.2 Public awareness events

Our public awareness initiatives successfully garnered press coverage on hypertension, diabetes, and dyslipidemia, shedding light on the challenges faced by primary healthcare providers and showcasing our project activities. Through training sessions, workshops, and open-door events, we reached a total of 961,831 viewers.

Between April 10, 2023, and January 15, 2024, Jargalan Project distributed 10 news articles across prominent traditional newspapers and online platforms such as Peak.mn, Morning News, 24tsag.mn, Daily News, Montoim.mn, and Arslan.mn. These outlets collectively reached a minimum of 98,159 individuals.

We produced 29 video news segments and educational materials tailored for broadcast on over 10 television networks and video news websites, amassing a total of 670,000 views. Each video, averaging 5 to 6 minutes in length, was also shared across various social media platforms for wider dissemination.

Health education videos featuring specialized doctors garnered over 580,100 views, accounting for 80.5% of our overall reach. Notably, the following three contents received the most engagement, indicating their effectiveness in resonating with the audience:

Peak News Preventable Diabetes

- Length: 5 mins
- Views: 270,000 views

Peak News Hypertension

- Length: 8 mins 15 sec
- Views: 208,000 views

Peak News Hypertension

- Length: 6 mins 53 sec
- Views: 43,000 views

Image 16: Articles with most engagements on social media

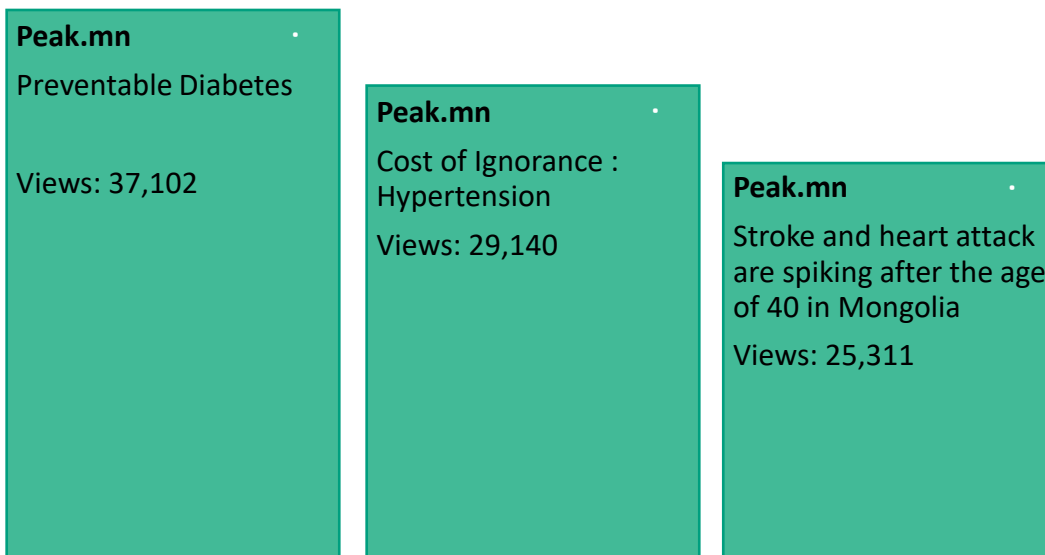


Image 17: TV news with the most engagements

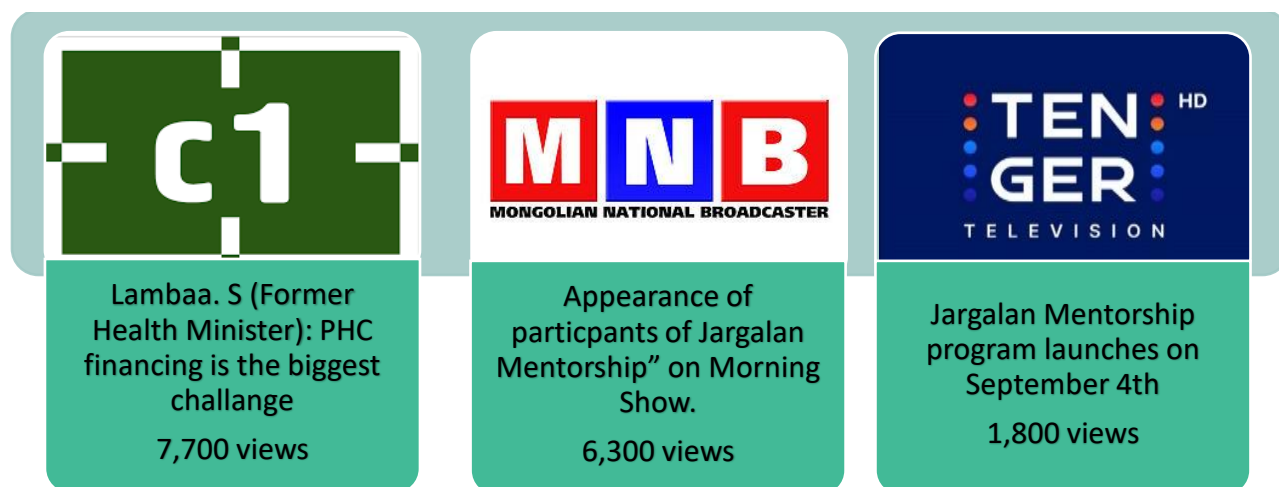
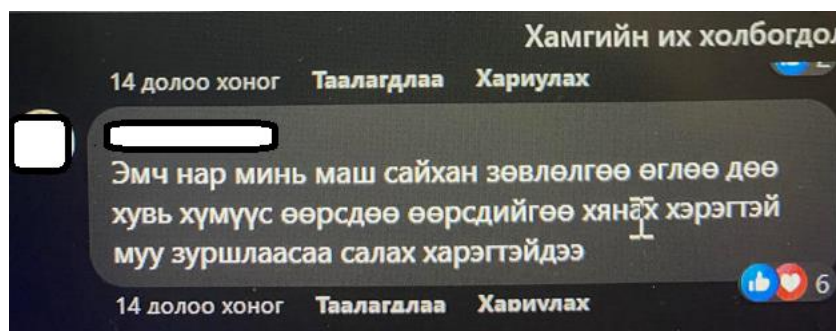


Image 18: Audience online comments on content



/"Doctors have given a very good advice. Individuals must control themselves and avoid bad habits"./

The Jargalan Project's public awareness activities played a crucial role in engaging Mongolian audiences, leveraging both traditional and digital media platforms to disseminate health education content effectively. Our observations indicate a strong preference among Mongolians for accessing health information via social media, particularly through mobile devices. As a result, we ensured that all our public health content was streamed on social media platforms, maximizing its reach and impact.

In analyzing viewership data, we found that shorter, concise content ranging from 5 to 10 minutes in length garnered the most attention, deviating from traditional preferences. Explainer videos and expert interview segments emerged as the most popular content genres, emphasizing the importance of providing easily digestible yet informative material. Additionally, incorporating multiple expert opinions in content creation proved to be highly effective in capturing and retaining audience attention.

One of the key achievements of our public awareness efforts was the creation of inclusive health education content featuring both specialty and primary doctors. This initiative aimed to rebuild public trust in FPGs and foster stronger partnerships across different tiers of healthcare delivery. The significant organic sharing of our content on social media, ranging from 1000 to 15,000 shares per post, demonstrated the public's

interest in quality health information and their willingness to engage in discussions on healthy lifestyles and disease prevention.

Moving forward, we recommend the following strategies to enhance health education outreach:

- Establish sustainable partnerships with media outlets to consistently cover public health topics and provide capacity building opportunities for journalists to specialize in healthcare reporting.
- Foster collaborations between primary doctors, specialty doctors, and the media to create a supportive and trustworthy community focused on healthcare communication.
- Maintain consistency in producing high-quality public health content that is both informative and engaging.
- Develop tailored strategies to disseminate health information and education in rural areas, ensuring accessibility and relevance to diverse audiences.

By implementing these recommendations, we aim to continue building our momentum in promoting health education and fostering constructive dialogues on non-communicable diseases, ultimately contributing to improved public health outcomes in Mongolia.

2.3 “Jargalan by Oddariya” application

Within the scope of the project, we planned to create a system that includes a mobile application for patients which is capable of monitoring some of their health indicators and getting advice and information, a web application for FGPs that allows them to monitor the health indicators of their patients, give information and advice when needed, and admin panel to administer the overall operation of the system.

App development

App development started immediately after the decision to implement the project and was implemented in the following stages.

Image 19: App development stages



In the first stage, we explored and researched similar applications, identified target users, determined system requirements, and created a user interface design.

The target users of our application are the people who live in Ulaanbaatar and those who have hypertension, DM and dyslipidemia or those who have risks of these diseases. Some studies show that the majority of this group of people are over 40 years old. Therefore, we aimed to design our application to be easy to use with a simple interface, but also applicable to other groups.

84.3 per cent of Mongolians use the Internet. There are also 4.8 million mobile phone users, which is more than the population, so it can be concluded that the use of mobile phones and social media is relatively high for the citizens of Ulaanbaatar.

We also planned to design our application to be as simple as possible, available for use on the mobile phones of our target users. Regarding mobile operating system penetration in Mongolia, 60.7 per cent of the total mobile devices are Android devices, and 38.6 per cent are iOS devices.

At the end of the first stage, we produced terms of reference for the application and the first version of the user interface design.

Procurement

We sent our ToR, including related documents, to 8 software development companies and received technical and financial proposals from 5 of them. Then, the Board of the foundation chose Gerege Medtech LLC after reviewing proposals based on the following.

- Previous experience in the healthcare sector in Mongolia
- Financial proposal
- Capacity to maintain and develop the application in the long term

Thus, we signed a contract with this company in April 2023 and started developing the application.

Development and testing

The overall development phase took 3 months and the mobile application for both Android and iOS, web application for FPGs, and admin panel were developed within this timeframe.

We used the open-source application development framework Flutter for the mobile application and the Vue.js framework for the JavaScript programming language for the web application and admin panel.

During the development stage, the IT advisor and health specialists of the foundation worked closely with the software development team. We had weekly meetings with the team to oversee and monitor progress, as well as regular contact with email, instant messaging, and calls when needed.

The initial alpha release of the application took place in June 2023, and testing started. The bugs and improvements identified during testing were recorded and fixed accordingly. As of February 2024, 43 issues and improvements had been recorded and resolved.

Deployment to the App Store and Play Store

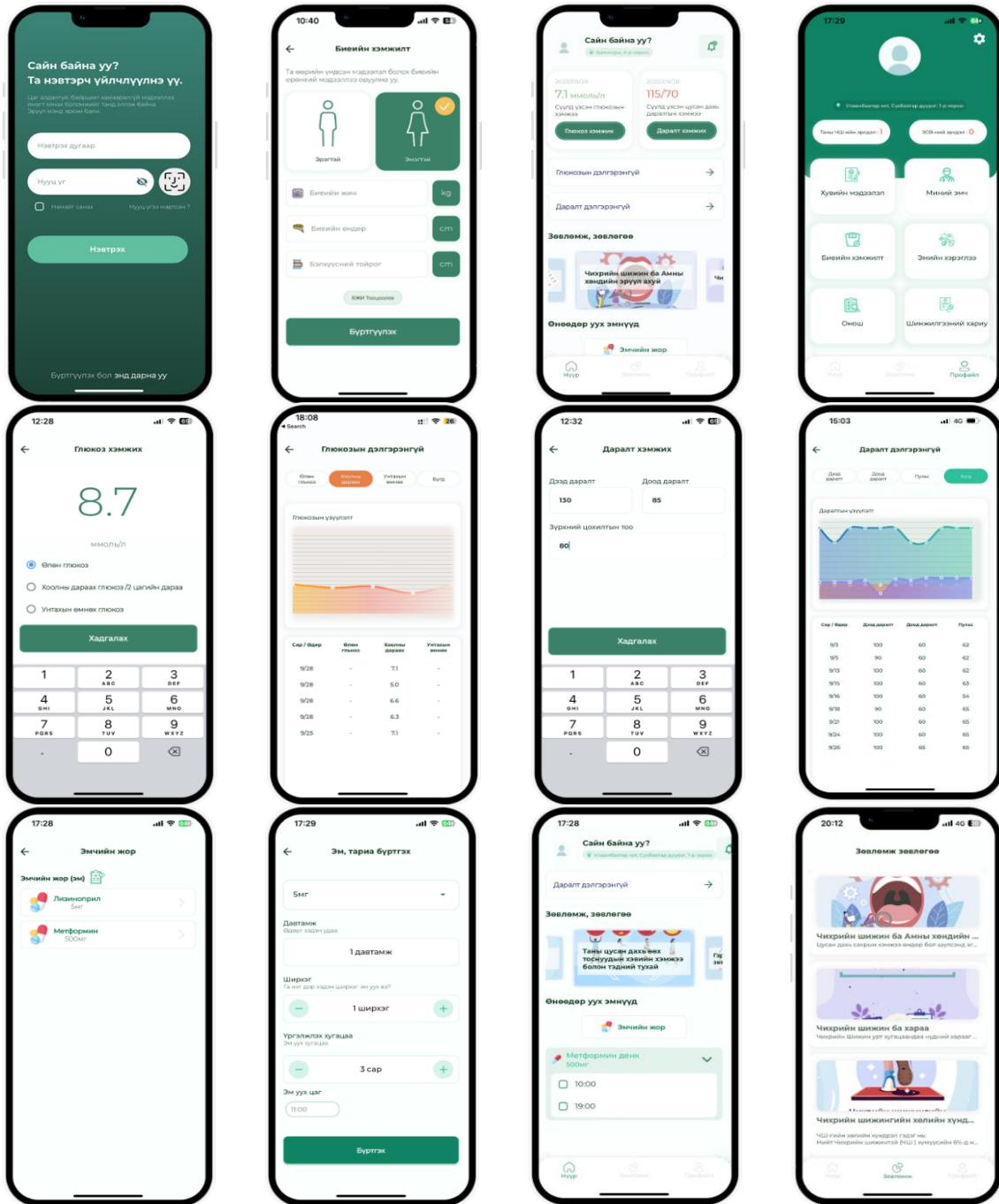
After testing the initial release and resolving identified issues, we initiated our request to deploy the application to marketplaces such as Apple AppStore for iOS and Google PlayStore for Android devices in June 2023. Those platforms review the application and related documents against several domains, including legal, security, privacy and contents.

We were successfully approved to release our application on the Google Play Store in June 2023 and the Apple AppStore in August 2023, and users have been able to download and use it since then.

The application registers some private information such as age, gender, civil registration number and phone number as well as personal sensitive data such as blood glucose level and blood pressure. According to the Mongolian law on protecting personal information, app providers are required to get approval from users to collect their information. Therefore, we prepared and introduced a privacy policy to the user and received consent before they registered and used the application. It is worth noting that this privacy policy is a crucial requirement for deploying the application to the AppStore and PlayStore.

In addition, Apple requires us to provide all content and advice provided through the application with references and citations because those are health-related information. Initially, we proposed to release our application with the name 'Jargalan', but Apple required that health-related applications include their provider's name on their application name. Therefore, we changed our app name to 'Jargalan by Oddariya'.

Image 20: App user interface



After we released our application, we started promoting it to the public in September 2023. We prepared and disseminated 1,000 brochures and video content. We also organised a referral program with incentives between FPGs participating in our mentorship program and collaborated with volunteer students. We also

introduced the application to the public during events organised on World Diabetes Day and World Heart Day.

Image 21: App brochure



10

Зөвлөгөө цэснээс манай эмч, мэргэжилтнүүдийн бэлтгэсэн эрүүл мэндийн зөвлөгөөтэй танилцарай.



11

Профайл цэснээс оорийн хувийн мэдээлэл, хяналт тавьж буй эмч, онцгой зарим шинжилгээний харилгаа харарай.



12

Биеийн жин, өндөр болон бусад биеийн тойргийн мэдээлэлээ шинэчлэх боломжтой.



13

Таны оруулсан мэдээлэлд үндэслэн Чиррийн шижин болон зүрх судасны эрсдэлийг үнэлсэн үнэлгээг харах боломжтой.

Аппликейшнийг ашигласнаар Та:

- Цусны даралтаа тогтмол хэмийг бүртгэх, харьцуулан хянах
- Цусан дахь сахарын хэмжээгээ тогтмол бүртгэх, харьцуулан хянах
- Биеийн жингийн индекс болон биеийн хэмжээгээ тогтмол бүртгэх, харьцуулан хянах
- Бүртгүүлсэн үзүүлэлтүүдэд тулгуурлан олон улсад зөвшөөрөгдсөн тооцоолуурын аргаар чиррийн шижин болон зүрх судасны өгнөчий эрсдэлийн үнэлгээг тооцож харах
- Жороор олгогдсон эмийн танилцуулга мэдээллийг авах
- Эм уух цагийн сануулга тохируулах, тэмдэглэх
- Ухаалаг календарийн тусламжтайгаар харьяа ӨЭМТ-ийн эмчийн хяналтын үзлэг, шаардлагатай шинжилгээг хийлгэх төвийн тухай сануулга авах
- Харьяа ӨЭМТ-ийн эмчтэйгээ харилцан мэдээлэлээ хуваалцаж, тогтмол хяналтад орох
- "Зөвлөмж зөвлөгөө" хэсгээс нарийн мэргэжлийн эмч нарын оролцсон торол бүрийн эрүүл мэндийн зөвлөгөөг зөвлөмжүүдтэй танилцах

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ЭРҮҮЛ МЭНДИЙН АППЛИКЕЙШН

Та энэхүү аппликейшнийг ашиглан оорийн эрүүл мэндийн хяналтаа сайжруулж, оорт тулгарч буй санаа зовоосон шинэ тэмдгүүдийг оновчтой тодорхойлж, үнчирч болох эрсдэлээс цаг алдалгүй урьдчилан сэргийлэх хүндрэлээс зайлсхийх боломжийг бүрдүүлнэ.

Jargalan by СӨӨММЛА



Jargalan by Oddariya аппликейшнийг ашигласнаар танд хэрэглэгчийн бүртгэл үүсгэсэн бийг шаардлагагүй болгоод та өмнө нь бүртгүүлээгүй бол зурагт улаанаар уаулсан товч дээр дарж шинээр бүртгүүлээрэй.

- Бүртгүүлдээ та оорийн гар утасны дугаараа оруулах ба таны утсанд баталгаажуулах мессеж ирнэ. Цаашдаа гарны утасны дугаар нь нэвтрэх нэр болно.
- Үүний дараа, халт, регистрийн дугаар, биеийн жин, өндөр зэрэг мэдээлэлээ оруулснаар бүртгэл дуусна.



- Үүсгэсэн бүртгэлээрээ нэвтрэн орсон дараа аппликейшний үндсэн цсхк дараах байдалтай харагдана.
- Глюкоз хэмжигч, даралт хэмийг товч дээр дарж оорийн цусны давь савар болон цусны даралтын мэдээллээ оруулна.
- Бүртгэсэн мэдээллээ мөн дэлгэрнэ үй харах боломжтой.



1



2

Цусан дахь сахарын хэмжээг **Өгнө үеийн, Хоолны дараах, Унтахын өмнөх** гэсэн 3 сонголтоос сонгож оруулна.



3

Даралтын мэдээлэл оруулах цонхонд **дээр, доод даралт, зүрхний цохилтын тоогоо** оруулах боломжтой.



4

- Алт-ийн хэрэглэгч та харьяа ӨЭМТ-ийн эмчдээ онцж бүртгүүлснээр эмийн жор бичүүлж авах, оруулсан мэдээллээ тогтмол хянуулах боломжтой болно.
- Танд эмийн жор бичсэн бол **Эмчийн жор** товч дээр дарж уух эмээ бүртгэх боломжтой болно.
- Жорын дагуу бичигдсэн эмийг уух давтамж, тун цагийг оруулснаар танд алт-аас эмээ цагт нь уух тухай сануулга илгээнэ.



5

Хадгалсан мэдээллүүдээр график үүсгэн харуулах бөгөөд сонголт бүрээр тусд нь харах боломжтой.



6

Даралтын мэдээллээр мөн график үүсгэх бөгөөд **дээр, доод даралт, зүрхний цохилтыг** тус бүрд нь харах боломжтой.



7

Эмчээс танд бичсэн эмийн жор дээрх хэлбэртэй харагдана.



8

Өмнөх цонхоос эмээ сонгоод уух тун, давтамж, цагийг оруулж хадгална.

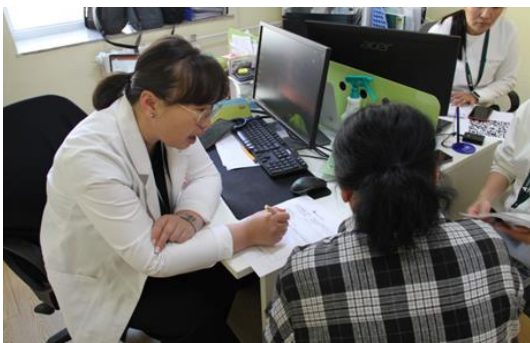


9

Public outreach events

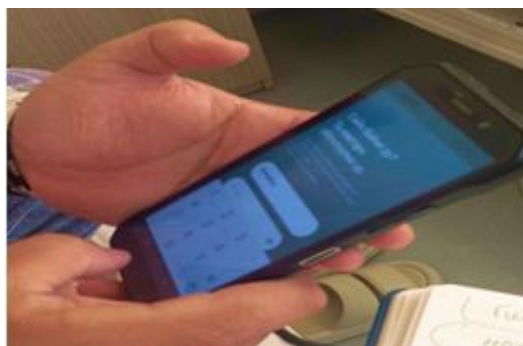
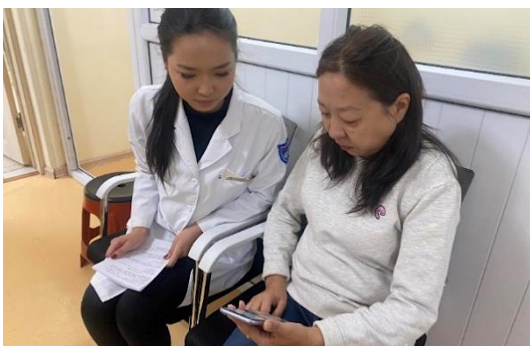
On September 4th, 2023, we held a road show event at the FPG in the 17th khoroo³ of Khan Uul district. Our team and volunteers assisted attendees by guiding them through the app installation process and providing tips on how to use the app effectively. The event was focused on mentoring and we worked closely with attendees to make sure they have a better understanding of our services and how they can benefit from them.

Image 22: FPG in the 17th khoroo of Khan Uul district



Our team collaborated with doctors from the First Central Hospital of Mongolia on World Heart Day, September 30th, 2023. We introduced an app to approximately 100-150 patients in Darkhan City.

Image 23: Introducing app on World Heart Day



From October to December 2023, the application was introduced to the citizens who receive services from mentee FPGs participating in the Mentorship program in cooperation with the volunteers of the OSCE club of MNUMS.

³ khoroo – administrative unit of Ulaanbaatar, equivalent to sub-district

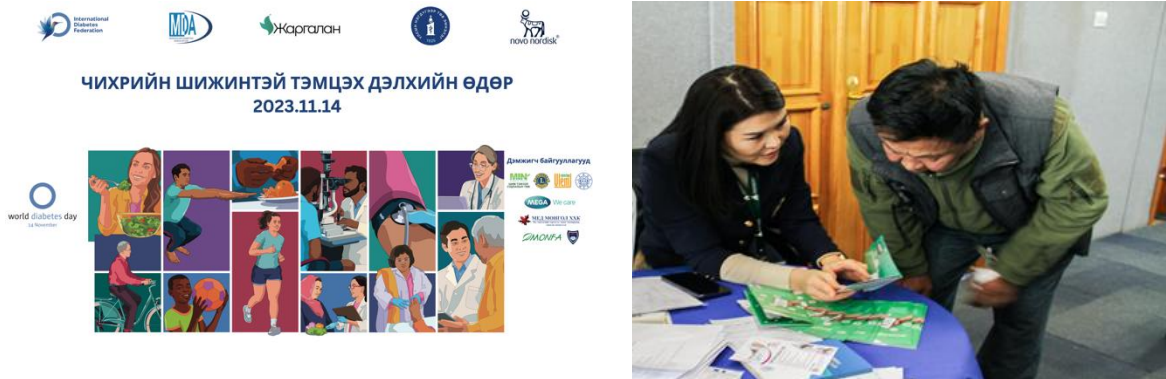
Image 24: Volunteer students of OSCE club from National University of Medical Science



On November 8, 2023, we organized a public outreach event in collaboration with the endocrinologists of the First Central Hospital at the Family Medical Center of the 16th khoroo of Chingeltei District. The aim of the event was to introduce and install an application and distribute 115 glucometers (sponsored separately) to patients diagnosed with diabetes.

On November 13, 2023, on the occasion of the "World Diabetes Day" event organized by First Central Hospital, more than 300 patients and citizens were given information on the introduction of the application and how to use it effectively.

Image 25: World Diabetes Day

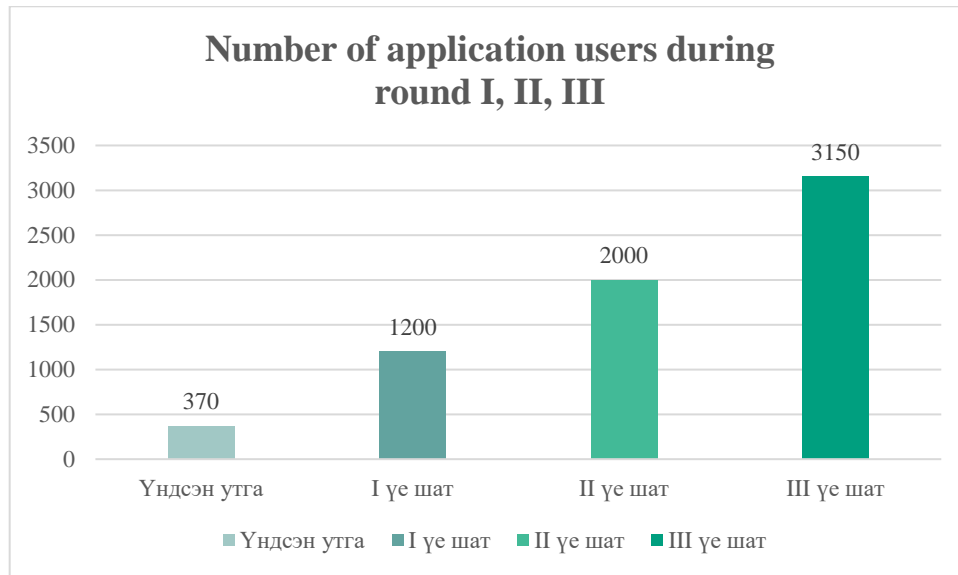


Referral program

From October 23 to December 29, 2023, a referral program was announced among mentees participating in our mentorship program. Mentees who referred 30 patients who have diabetes, hypertension or dyslipidemia to use the application received an incentive of 100,000 MNT (approximately 30 USD).

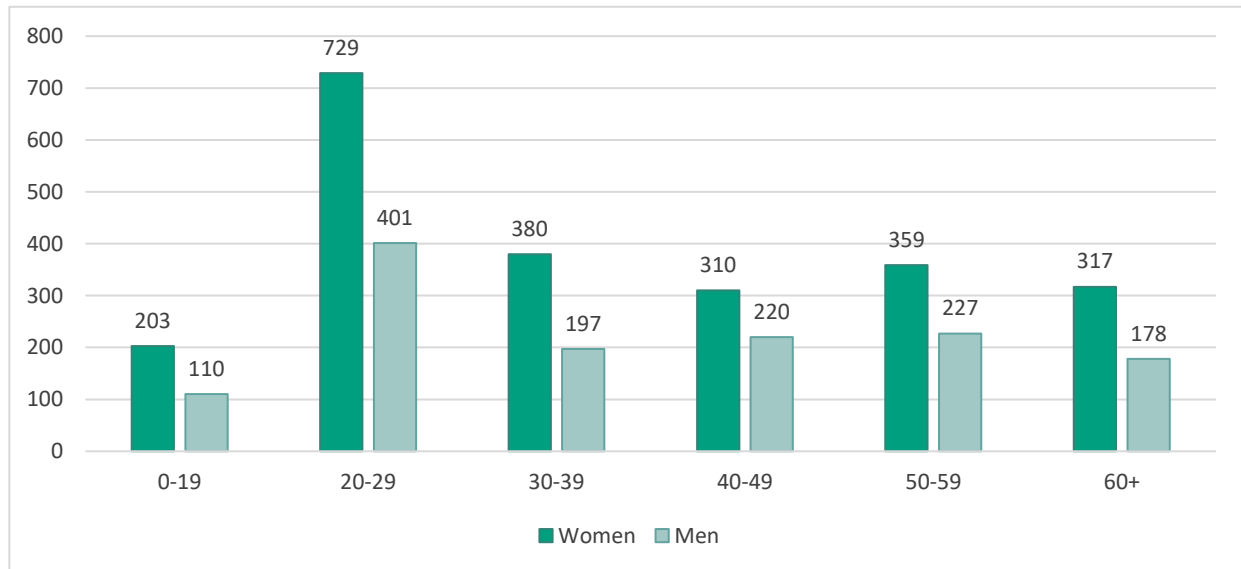
As a result of the above activities and programs, we have more than 3,000 users with more than 60% under supervision of their FPG doctors and we conclude that our public outreach activities and referral programs were successful and effective.

Figure 5: App user growth after periods of referral program



The following graphic shows the total number of users registered in the app by age structure and gender.

Figure 6: Users registered in the app by age group and gender, n=3631



According to the graphic, younger age groups use the application more than older users, possibly due to lower digital skills among older people in Mongolia. There were no major obstacles while developing the application.

However, we faced some difficulties during the implementation stage, most of which were impossible for the project team to solve. Particularly, the target user group's digital skills were weak. For example, while installing the application on their phones, it was common for them not to know or to have forgotten their Apple ID or Google ID passwords. Therefore, due to their digital skills, long-term application usage might be low for some users.

In some cases, the mobile phones of older people were too old and had very small screens, which limited the installation of the application. Also, while our team and volunteers were working at the FPGs, many older people did not have mobile data, or their phones were not able to connect to the Internet, which might be related to their living conditions and income level or the fact that many of them had not previously needed to connect to the internet.

Further considerations

The following actions should be taken in the future to improve the application further and to ensure its sustainability in the long term.

- Implement targeted marketing strategies across various platforms to bolster public awareness of the application and highlight its advantages.
- Collaborate with industry influencers to amplify the reach and credibility of the awareness campaign.
- Publish health-related information and advice to the application consistently
- Analyse user behaviour patterns within the application through advanced analytics tools to identify areas for improvement.
- Iterate and enhance the application based on the identified user needs, ensuring a user-centric approach to development.
- Prioritise features and improvements according to user feedback and industry trends.
- Raise funds to maintain the application and ensure its sustainability.

App users - behaviour change results

There were total of 3,631 users registered on the Jargalan app as of 22nd March, 2024. 63% of users were women and 61% of app users were under direct supervision of FPGs doctors.

Table 15: Jargalan app users' demographic information, age gender and diagnosis

	Number	Percentage
Total number of app users	3631	100%
Gender ratio - Female	2298	63%
Male	1333	37%
Average age of app users	39	
0 - 29	1443	40%
30 - 49	1107	30%
50+	1081	30%
Of which, under doctor supervision	2226	61%
of which, diagnosed with diabetes	505	23%
of which, diagnosed with hypertension	984	44%
of which, diagnosed with dyslipidimia	316	14%

As of 22 March, 2024, 43% app users had at least one follow-up visit with their doctors. 30% of users had recorded their blood pressure and heart rate, while 23% of users recorded their glucose levels. 204 (target 600) or 6% of app users had two follow-up visits with their doctors and their disease management behavior has improved. And 59 people or 1% of all users regularly monitored their blood pressure using the app.

Table 16: App users key numbers – behavioral change reflecting change in disease management

	Number	Percentage
Total number of people who were under doctor supervision	2,226	61%
Total number of people who had at least one follow-up visit with the doctor	1,544	43%
Total number of people who recorded blood pressure and heart rate (self-recording)	1,092	30%
Total number of people who recorded glucose levels (self-recording)	840	23%
Total number of people who had two follow-up visit with the doctor	204	6%
Total number of people who regularly registered their blood pressure on the app (at least 10 times)	59	1%

Despite relatively short period of time spent using the app, active user's average of key clinical quality indicators also improved significantly.

Table 17: Key clinical quality indicators change in first vs last measurement, mmol/L

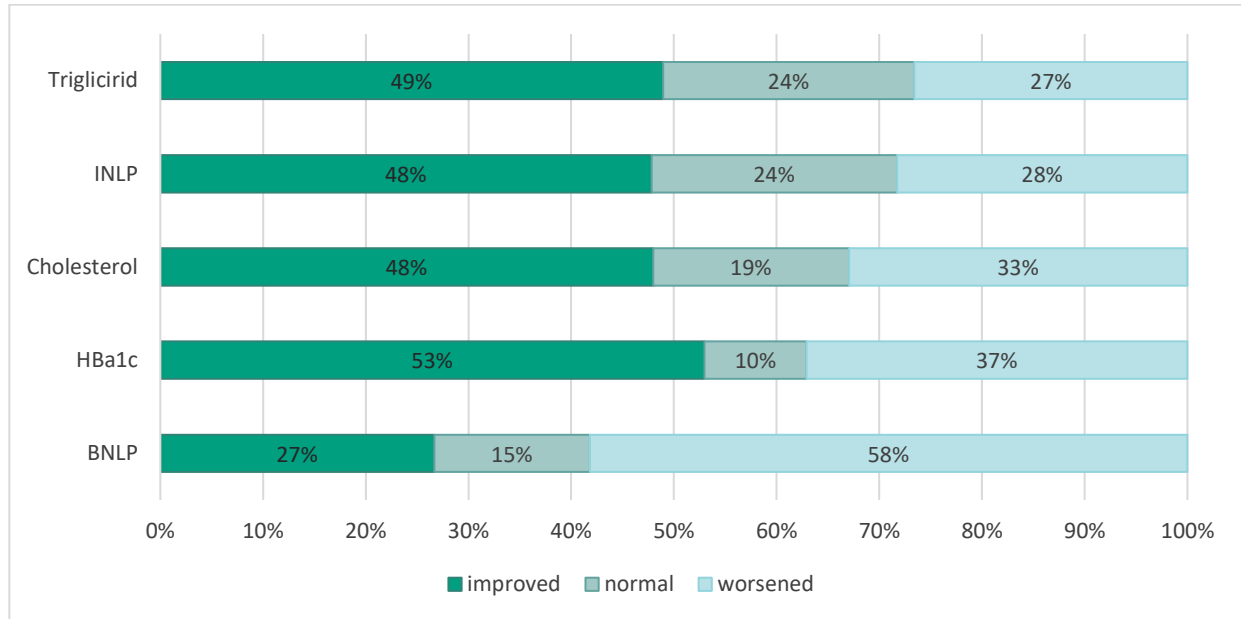
Key clinical quality indicators	First measurement	Second measurement	Result
HbA1C	8.58	8.10	improved
HDL	1.86	1.60	
LDL	3.07	2.70	improved
Cholesterol	5.22	4.93	improved
Triglycerid	2.37	2.14	improved

Table 18: Paired sample statistic test in first vs last measurement, HbA1c, HDL, LDL, Cholesterol and Triglycerides

	Paired Differences					t	df	Sig. (2-tailed) P value
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
First HbA1C - Last HbA1C	.47	2.50	.20	.07	.87	2.333	151	0.021
First HDL - Last HDL	.26	1.19	.10	.050	.46	2.564	138	0.011
First LDL - Last LDL	.36	1.43	.11	.140	.58	3.303	165	0.001
First Cholesterol - Last Cholesterol	.28	1.23	.09	.100	.47	3.063	173	0.003

First Triglycerides - Last Triglycerides	.22	1.34	.11	.000	.44	1.986	143	0.049
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Figure 7: Active app users clinical outcome change first 3 months versus last 3 months



Conclusion

The Jargalan Project has made significant strides in advancing healthcare services and public health education in Mongolia, with a primary focus on combating non-communicable diseases such as hypertension, diabetes mellitus and dyslipidemia. Through a multifaceted approach, the holistic project has achieved several key milestones and accomplishments:

Mentorship Sub-Program: The project successfully implemented a mentorship program, pairing experienced mentor doctors with FPG doctors to enhance clinical skills and knowledge in NCD management. A total of 122 mentees from 99 FPGs participated, resulting in a notable increase in mentees' knowledge compared to non-mentees.

Digital Learning Platform: An electronic learning system (www.hcp.mn) was developed to provide distance education and modern medical information to healthcare professionals across Mongolia. With over 2,000 website visitors and 206 registered users, the platform has facilitated access to essential training materials and guidelines.

Health Education Campaigns: The project conducted health education sessions for citizens, focusing on increasing awareness of NCDs and promoting healthy lifestyles. These sessions, attended by 764 patients and citizens, led to a significant improvement in participants' knowledge of diabetes, hypertension, and dyslipidemia.

Public Awareness Initiatives: Utilizing traditional and digital media platforms, the project effectively disseminated health education content to a wide audience, reaching over 960,000 viewers through press coverage and generating over 670,000 views on video news segments. The project's content strategy, emphasizing short and engaging videos, contributed to increased public engagement and awareness.

Partnerships and Sustainability: The project established partnerships with media outlets and key healthcare stakeholders including all level hospitals, health NGOs and academia to ensure the sustainability of health education initiatives. Recommendations were provided for establishing consistent, quality public health content and expanding outreach efforts to rural areas.

The sustainability of the project's achievements will be ensured and further enhanced beyond its completion. The Jargalan app will remain operational and accessible to users through the continued support of the Oddariya Foundation, serving as a vital resource for health education and awareness. Additionally, the HCP platform will persist in its evolution, be enriched with new features and content, and will be actively utilized by healthcare professionals across Mongolia, fostering ongoing collaboration, knowledge-sharing, and professional development within the healthcare community. The project team is also prepared and committed to continue to provide training for doctors, with prepared training modules readily available. In fact, our team and project outcomes are already being recognized for their success through various competitions and medical consultations.

In conclusion, the Jargalan Project has made significant strides in improving healthcare services, enhancing medical knowledge among professionals, and raising public awareness of NCDs in Mongolia. Through its collaborative approach and innovative strategies, the project is poised to continue to make a positive impact on the health and well-being of the population.