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ORIGINAL ARTICLE

Improved immunization access through health systems strengthening project for townships in Myanmar: a mixed method study

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ABSTRACT

Many areas of Myanmar have limited access to immunization due to a range of management, logistics and security barriers. The objectives of this study were to describe the situation of immunization services and the health systems strengthening (HSS) project, and to analyze the effect of the health systems strengthening project on access to immunization services. Mixed-method study design was used. Secondary data for all health systems strengthening and immunization services from 2011 to 2015 were collected. The qualitative data were collected by key informant interviews with 28 key stakeholders from the HSS project and the expanded program on immunization (EPI) project, and six study townships and twelve Rural Health Centers, along with twelve focus group discussions with 121 mothers of children under two years of age. The results showed that DPT3/Pentavalent 3 immunization coverage increased from 79.4 in 2011 to 87.8 in 2015. The integrated service packages were conducted in remote areas. The appointed midwife to PHS 2 ratio went from 6.57 in 2011 to 2.06 in 2015. The government budget mainly supported salaries, and the HSS project supported integrated immunization service packages and supervision. In addition, the basic health staff (BHS) received leadership and management training. In conclusion, the findings of this study provided substantial insight into health systems strengthening factors such as service delivery, healthcare workforce, information, medical products and technology, financing and leadership, improving access to immunization services which have an effect on the national intervention programs and policies, and implementation of interventions.

Key words: health systems strengthening, access to immunization services, Myanmar

INTRODUCTION

Immunization is the most cost-effective public health intervention for reducing global child morbidity and mortality.[1-9] Immunization averts an estimated 2 to 3 million deaths every year from diphtheria-pertussis-tetanus (DPT3), and measles.[10]

The vaccination coverage of diphtheria-pertussis-tetanus (DPT3) reflects access to basic health services and is therefore regarded as a valuable indicator of a country's routine immunization performance. DPT3 consists of a series of immunizations to prevent diphtheria, pertussis and tetanus,[11] whereas a full course of the vaccine requires several visits to healthcare or immunization centers.

Despite improvements in global vaccine coverage during the past decade, regional and local disparities resulting from limited resources, poor management of health systems, and inadequate monitoring and supervision are still present.[10] Many areas of Myanmar have limited access to immunization and other healthcare services due to a range of management, infrastrature, logistics, and security barries.[12,13] The Global Alliance for Vaccines and Immunizations (GAVI) supported Myanmar to strengthen its health system with a four-year (2012-2015) Health System Strengthening (HSS) project.[14-17] Therefore, it is essential to show the evidence-based findings of the previous and existing health system situations. The objectives of this study were first, to describe the status of immunization services and the health systems strengthening project, and secondly, to analyze the effect of the health systems strengthening project on access to immunization services.

METHODS

Study Design

The mixed-method study design was used, with quantitative and qualitative methods applied, to explore the complex intervention of factors that influence the implementation of health systems strengthening (HSS) in Myanmar. Ethical approval was given by the Ethics Committee of the Faculty of Public Health, Mahidol University, from August 25, 2016-August 24, 2017. Certificate of Approval No. MUPH 2016-111.

Sampling and Sample Size

This study was conducted in two phases: all HSS project townships were included in phase one, and multistage sampling was used for phase two. Six townships were selected based on the highest and lowest DPT3/Pentavalent 3 Immunization coverage of 2015: from year one, 19 HSS townships; year two 40 HSS townships; and year three 60 HSS townships. Seeing as one of the HSS objectives was to improve DPT3/ Pentavalent 3 Immunization coverage, it was fitting that DPT3/Pentavalent 3 coverage was used for the selection of townships for this analysis. Two rural health centers (RHC) were randomly selected from each participating township, making twelve rural health centers (RHC) being included in this study.

Data Collection

In phase one, secondary immunization coverage data from 2011 to 2015 and health systems strengthening data from 2012 to 2015 for all HSS project townships were documented. In phase two, the qualitative method of data collection was used to explore the state of health systems strengthening and access to immunization services by (a) key informant

interviews with 28 key stakeholders from the central health systems strengthening (HSS) and the expanded program on immunization (EPI) projects, six study townships and twelve Rural Health Centers, and (b) twelve Focus Group Discussions with 121 mothers with children under two years old.

Five research assistants were recruited, who participated not only for data collection but also in presenting of data collection tools. They were from the state or regional Health Department, and well experienced in conducting surveys, key informant interviews, and focus group discussions. They participated in a 5-day refresher training on background and rationale of the study, its objectives, and ethical considerations, to strengthening certain qualitative research techniques. Research instruments for this study such as questionnaire, guidelines for both key informant interview, and focus group discussion, were constructed from a review of available literature on immunization coverage, health system strengthening, and WHO research tool kit. [18-23]

The exclusion criteria were townships that did not participate in the HSS project, data that was not concerned with health system strengthening and immunization services, and persons who were not responsible for health systems strengthening and immunization services.

Data Analysis

The quantitative data were validated and verified before the data analysis. The standard statistical program was used for quantitative analysis. Descriptive statistics such as frequency, percentage, mean, and Standard Deviation (SD) were used to describe the data for each variable. The generalized estimating equations (GEE) were used to analyze the effect of health systems strengthening project on access to immunization services. The generalized estimating equations (GEE) is an important strategy in analysis of longitudinal and correlated response data. These data sets can arise from longitudinal studies, in which subjects are measured at different points in time. [24-25] It is an extension of the quasi-likelihood approach, which is essential to identify factors influencing the implementation of health system strengthening and access to immunization services.

The qualitative data recorded and noted were transcribed, and transcripts were cleaned up by stripping off non-essential words. Content analysis was chosen to analyze the qualitative data by the Principal Investigator. The researcher aimed to overcome the intrinsic bias that may exist from a single method and single data source by combining multiple methods and data sources in order to contribute significantly to the overall credibility of the findings of this study.

RESULTS

Situation of DPT 3/ Pentavalent 3 Immunization in HSS townships

Secondary data showed that DPT 3/Pentavalent 3 immunization coverage increased from 2011 to 2015 (Table 1). Out of 119 HSS project townships, there were 75 townships in 2011 with DPT3/Pentavalent 3 immunization coverage (≥80) which increased to 91 in 2014 and 106 townships in 2015.

Table 1. DPT 3/ Pentavalent 3 Immunization Coverage from 2011 to 2015

DPT 3/ Penta 3	**2011**	**2012**	**2013**	**2014**	**2015**
Mean (±SD)	79.4(±16.2)	79.6 (±16.6)	69.6 (±13.9)	84.6 (±11.5)	87.8 (±9.0)
Minimum	16.4	17.1	21.0	31.7	31.4
Maximum	99.4	100.0	91.3	99.5	97.8

The situation of HSS of immunization services in health systems strengthening projects of townships in Myanmar

The HSS project started with 20 townships in year one (2012), then added another 40 townships in year two (2013) and then 60 townships in year three (2014) for a total of 120 townships. In 2012 there was civil unrest in the Muangdaw township of Rakhine State, so it was impossible to continue the HSS project for integrated immunization services as planned in that township. So, consequently HSS year one townships were eventually reduced to 19 with a final total of 119 townships being included in this study. The integrated immunization service packages were delivered in remote areas in all HSS townships. The health service packages provided immunization to both immunized and unimmunized children (Table 2). The healthcare staff had organized a basic coordinated township health plan (CTHP) for integrated health service packages before implementation. The Expanded Program of Immunization (EPI) was one of the activities included in the service package. The healthcare staff traveled to the most remote areas and provided integrated healthcare services to the communities. Therefore, the people living in these remote areas had access to immunization and other healthcare services.

Table 2. Service Delivery in HSS Townships from 2012 to 2015

Service Delivery	**Year**	**Townships**	**Total**	**Mean**
Integrated service packages	2012	19	2, 342	123.3
	2013	59	6, 111	103.6
	2014	87	5, 366	61.7
	2015	115	10, 557	91.8
Children received DPT 3 / Pentavalent 3 during the package	2012	19	4, 446	234
	2013	59	9, 853	167
	2014	87	6, 750	77.6
	2015	115	10, 057	87.5
Children received immunization during the package	2012	19	16, 289	857.3
	2013	59	48, 534	822.6
	2014	87	31, 048	356.9
	2015	115	50, 027	435.0
Number of unimmunized children (>1yr) who received	2013	59	3, 634	61.6
	2014	87	1, 528	17.6

Service Delivery	Year	Townships	Total	Mean
their initial immunization during the package	2015	115	2, 791	24.3

The healthcare workforce was faced with increased sanctions for appointed basic health staff, including midwives (MF) and entry-level public health supervisors (PHS 2) from 2011 to 2015. The designated midwife to PHS 2 ratio (MW: PHS 2) decreased from 6.57 in 2011 to 2.06 in 2015 (Table 3).

Table 3. Health Workforce in HSS Townships from 2011 to 2015

Health Workforce		2011		2012		2013		2014		2015	
		S	A	S	A	S	A	S	A	S	A
MW	Mean	33.5	29.4	35.2	33.4	36.6	34.9	37.7	36.1	45.2	40.9
	SD	13.6	12.7	14.4	14.2	15.3	14.7	16.2	15.6	20.4	17.7
	Total	3,985	3,501	4,187	3,977	4,358	4,156	4,486	4,291	5,373	4,865
PHS 2	Mean	8.3	4.5	24.4	5.4	32.2	16.4	32.8	16.6	38.8	19.8
	SD	6.9	4.8	14.4	5.9	15.1	13	15.8	13	18.2	15.4
	Total	984	533	2,900	638	3,827	1,954	3,906	1,976	4,618	2,357
Total BHS	Mean	56.6	47.4	76.2	53.2	85.5	65.9	87.6	67	103.6	75.4
	SD	23.7	20.9	31.1	23.8	35.2	30	35.7	30.7	45.5	34.4
	Total	6,738	5,640	9,064	6,330	10,176	7,845	10,419	7,973	12,332	8,968
MW: PHS 2		4.05	6.57	1.44	6.23	1.14	2.13	1.15	2.17	1.16	2.06

S= Sanctioned A= Appointed

One basic health staff (BHS), front line workers who carry out the management of health services at the community level was responsible for an average population of 2,996 and covered five villages in 2011; a population of 2,667 covering five villages in 2012; 2,212 covering four villages in 2013; 2,230 and covered four villages in 2014; and in 2015, a population of 2,074 covering three villages. While one midwife was responsible for an average number of population 4,937 and covered eight villages in 2011; 4,260 covering seven villages in 2012; 4,119 covering seven villages in 2013; 4,188 covering seven villages in 2014; and 2015, a population of 3,742 and covered six villages.

Health information from all HSS year one and year two townships was presented by integrated service package tour reports to the central HSS unit in 2012 and 2013. Out of 119 townships, 87 townships reported in 2014 and 115 townships reported in 2015. The HSS officers from the State or Region level compiled monthly HSS reports from these townships and then sent the health information reports to the central HSS office. The HSS officers could not provide feedback directly to the townships, for the health information had to be sent directly to HSS officers at the central level meeting. The reports from the Expanded Program of Immunization (EPI) from the townships were usually sent to the State or Regional

health department, Health Information Division, and the EPI unit at the central office.

The vaccines and equipment for immunization services were supplied from data in the EPI report. The HSS project supported hospital drug kits, RHC kits, MW/Sub center kits (Table 4). The vaccines for immunization were supported by UNICEF and GAVI, and later from government supply. The procurement and medical supplies were supported by UNICEF and government and the technical support was mainly provided by WHO to all HSS townships.

Table 4. Medicines and Equipment from HSS Project from 2012 to 2015

Year	Townships	Hospital Drug Kits	RHC Kits	MW/ Sub center Kits
2012	19	72	101	459
2013	59	262	255	951
2014	119	606	455	2211
2015	119	606	552	2699

Financial support from the government budget was mainly for salaries, and the HSS project support was for integrated immunization service packages and project supervision. Only 116 townships were included in this study, seeing as the government budget data was not provided for three townships (Table 5).

Table 5. Financial Support from 2012 to 2015

Financial Support	Year	Townships	Total (Million US$)	Total (Million Kyats)	Mean	SD
Government Budget	2012	116	14.62	19, 000. 00	160. 70	137.85
	2013	116	28.46	37, 000.00	319. 10	311. 99
	2014	116	34.62	45, 000.00	390.50	421. 40
	2015	116	41.54	54, 000.00	465. 70	489. 85
Financial Support from HSS for package and supervision	2012	19	0.02	27. 93	1.47	1. 00
	2013	59	0.11	140. 06	2.37	1. 42
	2014	119	0.75	978. 44	8.22	4. 75
	2015	119	0.76	989.98	8.32	5. 16

(1 US Dollar ≈1300 Kyats)

As with training of trainers (TOT), leadership training was conducted at Department of Health, Nay Pyi Taw and the multiplier trainings was conducted at the townships. Two township supervisors from each township (TMO and one township supervisor) attended the TOT training, and then they gave multiplier trainings to all basic health staff (BHS) at the townships. The total number of BHS who were given the leadership training was 238 at Department of Health and 8,325 at townships.

The effect of the health systems strengthening project on immunization coverage (DPT3/ Pentavalent 3) showed

that the DPT3/ Pentavalent 3 immunization coverage increased 5.21 percent in 2014 and 8.47 percent in 2015, compared with the baseline of 79.36 percent in 2011 showed statistical significance in both 2014 and 2015 (Table 6).

Table 6. Generalized Estimate Equation (GEE) analysis with DPT 3/Pentavalent 3 immunization coverage at 2011, 2014 and 2015

Parameter	B	SE	95% CI	p value
(Intercept)	79.36	1.48	(76.46, 82.26)	< 0.001
2015	8.47	1.41	(5.71, 11.24)	< 0.001
2014	5.21	1.42	(2.42, 7.99)	< 0.001
2011	0[a]	.	.	.

Dependent Variable: DPT3/ Pentavalent 3 Immunization Coverage

Access to immunization services was known by all mothers from the focus group discussions. They also knew that the midwives gave the health care services and immunization in their villages. The services given during integrated immunization service packages were immunization, maternal and child health (MCH), nutrition and environmental sanitation. All focus groups discussions reported that the integrated immunization service packages improved access to immunization services. Accessibility to the healthcare service packages were available from the health centers, as reported by six focus groups; three focus groups reported that they were able to have access to the immunization services when the midwife (MW) came to their villages; and three focus groups reported that they did not go to the health center because it was too far for them.

DISCUSSIONS

This study showed that the mean DPT3/ Pentavalent 3 immunization coverage for all health systems strengthening project townships was 79.4 in 2011 and 87.8 in 2015. Out of 119 HSS project townships, the townships with DPT3/Pentavalent 3 immunization coverage (≥ 80) were 75 in 2011, then increased to 91 townships in 2014, and 106 townships in 2015. Therefore, increased access to immunization services led to increased immunization coverage. This study supported that many analyses from different regions of the world had the factors that contribute to low immunization coverage. The geographical complexities of mountains, and dispersed populations make public health service delivery challenging.[18]

The findings from this study supported the findings of Global Vaccine Action Plan (GVAP) annual report 2016. In GVAP 2016 report, 126 out of 194 WHO Member States (65%) reached national DTP3 coverage of ≥ 90% in 2015. Only 52 out of 126 countries (27%) had coverage of 80% or more in all districts, and therefore, met the GVAP target. The remaining countries required innovative strategies in order to meet the GVAP goal.[27] Myanmar was one among the countries with DPT 1 coverage ≥ 90% and DPT 3 coverage of 50-89% and continued to address dropout rates by improving quality and predictability of service delivery and reducing missed opportunities.[27]

This study supported other previous research that integrated service packages were provided to people in hard to reach

areas in HSS townships. The integrated immunization service packages were provided by basic health staff (BHS), who conducted all activities at the village level,.[28] such as immunization, antenatal care, postnatal care, weighing of under-five-year-old children, environmental sanitation, and health education. These findings supported previous studies that, when considering integrating activities, decision-makers should evaluate community-level preferences and demands for integrated services. [29]

This study found that all basic health staff increased, including midwives (MW) and public health supervisors 2 (PHS 2), from 2011 to 2015. The appointed MW to PHS 2 ratio reduced from 6.57 in 2011 to 2.06 in 2015. In the 2013 assessment, the MW to PHS 2 ratio was ten to one, considering that the national standard ratio for MW to PHS 2 ratio was one to one.[28] One basic health staff was responsible for a population of 2,996 and covered five villages in 2011, and a population of 2,074 covering three villages in 2015. One midwife was responsible for a population of 4,937 and covered eight villages in 2011, and a population of 3,742 covering six villages in 2015. The findings showed differences between basic health staff and midwives per population and villages. There is a need to consider sanctioned and appointed basic health staff including midwives.

This study confirmed that the Health Management Information System (HMIS) was the health information system of the Ministry of Health and Sports for both public health and hospital care at all levels. These systems depend mainly on the health staff and health care facilities at the village and ward, township, district and region or state levels.[30] This study documented that the supplied data for vaccines and equipment were from the EPI project, and the health systems strengthening data was from the HSS project. These findings confirmed that these projects had to collect data on health and health related sectors and report monthly for monitoring and mid-year and yearly evaluation.[14, 16, 17, 31]

This study documented that the HSS townships received hospital kits, RHC kits, and MW/ Sub-center kits from the HSS project. The vaccines and equipment for immunization services were supported by the EPI project. This study confirmed that the logistics of these supplies were maintained by the government with support from UNICEF, WHO and GAVI funds.[32]

The study also confirmed that the government budget was the major source of financing and salaries. [19] The HSS project funds were mainly for travel and daily allowance for integrated service packages and supervisions. All activities in the coordinated township plan were estimated and funded by the HSS project. [33] The integrated service packages were provided by basic health staff to improve the accessibility of service to the townships. As a result, this promoted the supply side by improving financial incentives for basic health staff to increase the accessibility of services. [12, 34, 35] The formative study findings confirmed that the EPI project was led and run by the Ministry of Health and Sports with the support of international agencies.

The leadership training was designed and developed for training the township medical officers (TMOs), basic health staff (BHS) with an experiential learning opportunity to apply leadership concepts and approaches together with tools to improve the basic health staff to better understand the effectiveness of team building.[36] This study confirmed that in the township health team, Township Medical Officer was the leader of the township health team.

Regarding access to immunization services, all mothers from focus group discussions knew the midwifes gave health

care services and immunization in their villages. The formative findings of this study documented that the factors influencing access to immunization services were (1) heavy rain, (2) travel time due to distance from the health center, (3) lived in deep forest, so unable to go for immunization, (4) difficulty to visit the health center during the time of agriculture, (5) busy work of mother, (6) fever after immunization, (7) swelling at the site of the injection, (8) low health knowledge, (9) financial barrier because most of the mothers are poor, (10) afraid to pay money because they did not know immunization was given free of charge, (11) not familiar with midwives, (12) different languages, and (13) older adults in the family avoid immunization. Eleven focus groups reported improved access to immunization services, and one focus group reported that there were not many differences.

CONCLUSION

The DPT3/Pentavalent 3 immunization coverage for all health systems strengthening townships was 79.4 in 2011, which increased to 87.8 in 2015. The increased immunization coverage from 2011 to 2015 led to increased access to immunization services. The findings of this study provide substantial insight into the effectiveness of health systems strengthening such as service delivery, health workforce, information, vaccines and equipment supplies, financial support, and leadership on access to immunization services that have an implication on the national program interventions and policies for implementation.

RECOMMENDATIONS

The results obtained from this study could be beneficial for policy and implementation for immunization services and health systems strengthening such as service delivery, health workforce, information, vaccines and equipment supplies, financial support, and leadership. The findings of this study are recommended for the implication of health systems strengthening to all townships in Myanmar.

LIMITATIONS

This study focused on the implementations of health system strengthening of immunization services in Myanmar only, and cannot be compared or applied to any other countries, due to differences in culture, demography, social and political system.

ABBREVIATION

BHS: Basic Health Staff, DPT: Diphtheria Pertussis Tetanus, CTHP: Coordinated Township Health Plan, EPI: Expanded Program of Immunization, FGD: Focus group discussion, GAVI: Global Alliance for Vaccines and Immunization, HSS: Health Systems Strengthening, HSSO: Health Systems Strengthening Officer, HTR: Hard to reach, KII: Key Informant Interview, MCH: Maternal and Child Health, MOHS: Ministry of Health and Sports, MW: Midwife, PHS 2: Public Health Supervisors 2, RHC: Rural Health Center, TMO: Township Medical Officer, UNICEF: United Nations Children's Fund, WHO: World Health Organization

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