MEDICAL STATISTICS DIVISION

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Medical Statistics Division has been actively engaged in conducting research projects in areas of HIV, TB, Malaria, reproductive, maternal, newborn, child and adolescent health (RMNCAH) and health systems research. Statistical consultation and data analysis are also provided to researchers and post-graduate students.

RESEARCH PROJECTS

1. HEALTH POLICY AND HEALTH SYSTEMS RESEARCH

1.1. REPRODUCTIVE HEALTH

1.1.1 Sublingual misoprostol in the treatment of incomplete abortion: Operations Research in Myanmar

This study was conducted in Central Women Hospital (CWH), Yangon and Thingangyun Sanpya Hospital (TSH) from March to December 2016 in collaboration with Obstetricians and Gynaecologists from University of Medicine 1 and 2, Maternal and Reproductive Health Program, Department of Public Health and the Gynuity Health Project, USA. A total of 75 women who needed post-abortion care (25 from CWH and 50 from TGSH) were enrolled in this study and single dose of sublingual misoprostol (400 microgram) was given, observed 24 hours at hospital and follow up at 7-10 days. The primary outcome of this study was complete uterine evacuation with study medication alone at follow up visits. Over half of the participants were nulliparous and had high school and above education level. Some 93% of women returned for follow up and 5% of women required an extended follow up. About 61% of women had successful evacuation with study medication alone (72% at TSH and 40% at CWH). Of those returning for scheduled follow up, >90% were complete, 90% of the surgical interventions were performed within 24 hours of treatment not at scheduled follow up by providers' preference. About 30% had no side effect of misoprostol and among those who had side effects were minor and tolerable. No severe side effect was observed. About 90% of the women felt that the treatment was highly acceptable. About 75% of the women stated that they will choose this method again and would recommend it to a friend. Among the participants, 25% had no family planning while

75% of the women were offered contraception. Key informant interviews (KII) with seven providers were also conducted to explore their acceptability and experiences. Almost all providers involved in this study were satisfied with this method because of high success rate, reduced workload, easily available medicines and easy administration but a few were not satisfied. All providers had willingness to incorporate into their current practice. Regarding next intervention, 6 out of 7 providers recommended that this intervention should be performed up to station hospital level while one provider said it can be implemented even in primary health care level. In conclusion, this operations research highlighted the role of sublingual misoprostol in the treatment of incomplete abortion and to be considered to implement this method up to station hospital level.

1.1.2 Out-of-pocket expenditure on maternal and child health care services among rural households in Dedaye Township

This study was conducted with the aim of assessing the out of pocket expenditures of household on maternal and child health care services in rural areas. It was a cross-sectional study conducted in rural areas of Dedaye Township, Ayeyarwady Region in 2015. Face-to-face interview using a structured questionnaire was carried out with 331 households having mothers who have children age one year or below at the time of data collection. In analysis, the households were disaggregated into five quintiles based on their annual expenditure per capita. Among the mothers, 231 (73.8%) received antenatal care for at least four times, 225 (68%) delivered their last child with skilled birth attendants and 232 (74.1%) received postnatal care with skilled health personnel. Majority of the children 271 (83.9%) received childhood immunization for at least the first dose, BCG. Among 68 children who had been having health problems during their neonatal period, 45 (66.2%) sought health care from skilled health personals. Out of 139 children who had illnesses after their neonatal period, 99 (71.2%) received health care from skilled health providers. Lowest utilization of antenatal care, skilled birth attendants and post natal care were found among the households in the lowest expenditure quintile. Health problems among children were highest in the lowest quintile but the use of health care from skilled providers was lowest in this population. Apart from two households, almost all the households involved in this study have expensed out of pocket payments for MNCH care during the period of last child delivery. On average, the respondents spent 6% of their total household expenditure only for MNCH care. Institutional delivery was the most costly health care to be received by the study population and consumed about 8% of total household expenditure. On average, the households had to spend 12,750 kyats to 20,473 kyats for home delivery, 86,416 kyats to 228,255 kyats for delivery at government hospitals and 176,340 kyats to 335,063 kyats for the delivery at private hospitals. In terms of health care expenditure for the children, hospitalization was the most expensive health care for the households and average cost for hospitalization was 120,900 kyats. We found out that out of pocket expenditure for maternal and child health care caused financial catastrophe in 18.1% of households if the cutoff point is set at 30% and 9.4% of households if the cutoff point is at 40% of non food expenditures of the households. This study highlighted that MNCH care alone can cause households to be in financial catastrophe. There was a discrepancy in both utilization and household expenditure on MNCH care across the expenditure quintile. Financial burden was high among households where the women had undergone institutional delivery. Therefore maternal and child health care should be considered as a priority area in establishing financial protection mechanisms.

1.1.3 Accessibility and utilization of postnatal care among rural mothers at primary health care level in Myanmar

(Please refer to annual review of Health Systems Research Division)

1.2 HEALTH SYSTEMS STRENGTHENING

1.2.1 Primary health care systems strengthening in Hlegu Township at Yangon Region, Myanmar: Baseline studies (2015-2016)

The cross-sectional facility-based and community-based studies were conducted between December 2015 and March 2016 in Hlegu Township, Yangon Region in collaboration with Yangon Regional Health Department supported by Korea Foundation for International Healthcare (KOFIH). The surveys covered all health facilities from the public sector (one township hospital, 3 station hospitals, 12 rural health centres (RHCs) and urban health centres (UHCs) and 35 sub-RHCs and 235 households from 5 urban wards and 473 households from 16 villages.

Findings: A facility-based survey

The facility-based survey was conducted by trained medical officers using the questionnaire that extracted from WHO Service Availability and Readiness Assessment (SARA) tool. All of the health facilities had universal access to improved water source and sanitation facilities except two sub-RHCs (74% and 91%). One station hospital and nearly half of the sub-RHCs (42.9%) had no power source. Nearly all items of basic equipment: adult and child scale, thermometer, stethoscope, blood pressure apparatus were available. The majority of the health facilities had amenities for safe final disposal and the appropriate storage of sharps and infectious wastes. All of the hospitals and nearly all of the RHC/UHCs and sub-RHCs had items for blood glucose testing, malaria diagnostic capacity, HIV diagnostic capacity and urine test for pregnancy. For infectious diseases, most of the facilities had amoxicillin tablets, but nearly all of the facilities had no ceftriaxone injection. Nearly all of the facilities offered emergency contraceptive pills but none could offer progestin-only pills and injectable contraceptives and implant. IUCDs were available in township hospital, RHCs/MCH (50%) and in sub-RHCs (20%). Majority of the facilities did not have family planning guidelines, family planning check-lists and/or job-aids. All types of facilities reported the availability of iron and folic acid supplementation, tetanus toxoid vaccination and monitoring of hypertensive disorders in pregnancy. Antenatal Care (ANC) guidelines were available in RHC and UHC (17%) and sub-RHCs (43%). Only one station hospital and about half of RHC and MCH and sub-RHCs lacked at least one trained staff for ANC within previous 2 years. All RHC and UHCs and sub-RHCs offered delivery and neonatal resuscitation services while two third of these facilities offered the parenteral administration of oxytocin. About half of the RHCs and a quarter of the sub-RHCs reported to provide the different services for neonatal signal functions. There was a lack of availability of guidelines for essential childbirth care and check lists at the hospitals except for one station hospital. Partographs were not available at the station hospitals. Magnesium sulphate was only found at RHC/MCH (33%) and sub-RHC (6%). All township hospitals and one out of three station hospitals offered Comprehensive Emergency Obstetric Care (CEmOC) services had a staff trained in surgery and in anaesthesia.

Findings: A community-based survey

The community based survey was conducted by face to face interview using the semi-structured questionnaire focusing women of 18-49 years in selected households by the trained interviewers. A total of 3,326 people were resided in 708 study households (both urban and rural combined) and the sex ratio was 100.8 male per 100 female. The proportion of under-five children in the combined sample was 24.2%. The coverage of mobile phone and

television were lower in rural than in urban households (<85% vs. 91% and <70% vs. 82%). The median age of eligible women was 31 years in the combined sample of whom around 55% had low or no formal schooling. From urban wards, nearly 27% of respondents reported doctors as their antenatal care (ANC) providers during their last pregnancy in contrast to >80% of rural respondents who reported midwives. The average frequency of AN care was lower in rural study sites (with and without sub-centres) compared to urban wards (5.1 ± 2.4 and 4.9 ± 2.1 vs. 5.6 ± 2.7). Some women were unable to report any danger signs in pregnancy which was alarming and significantly higher in rural than in urban wards (29.1% and 27.5% vs. 16.6%; p=0.01). Around 19% of respondents from rural areas had reported their last delivery at the township hospital in contrast to 26.4% of respondents from urban wards who delivered at the specialist hospitals outside Hlegu Township. Those who resided at villages without sub-centres were more likely to report their births attended by unskilled TBAs (28.4%) compared to those from villages with sub-centres (18.3%). Postnatal care was mainly provided by nurse/midwife/lady health visitors (43.4%) in the combined sample and the highest proportion was reported among respondents from the villages with sub-centres (53.6%).This study highlighted the needs to promote the evidence-based decisions and knowledge translation by mapping of access to primary health care services and through better understanding of contributory factors towards gaps in both supply and demand sides.

1.2.2 Time and motion study on patient flow at first point-of-care units in tertiary care hospitals from the public sector, Myanmar (2016)

(Please refer to annual review of Epidemiology Research Division)

1.2.3 Assessment of utilization of Urban Health Centres in Yangon and Mandalay Regions

(Please refer to annual review of Health Systems Research Division)

1.2.4 Identifying hospital workload and satisfaction of inpatients at tertiary care hospitals, Yangon Region, Myanmar: Phase I

Globally, with increasing disease burden and limited resources, health systems are faced with challenges of providing adequate and quality care. Patients' satisfaction is one of the important indicators for assessing the quality of care in a hospital. Hospital workload is also closely related with quality of hospital care services and patients' satisfaction towards these services. Identifying the hospital workload and patient satisfaction is critical for better health care planning. In Myanmar, there is no known study on hospital workload and patient satisfaction measuring at the same time. Therefore, current study was conducted to understand the situation of patients' satisfaction and hospital workload at six tertiary care hospitals in Yangon. A cross-sectional hospital based survey applying both quantitative and qualitative methods was carried out among the patients discharged from the tertiary hospitals in Yangon. Six tertiary care hospitals were included namely Yangon General Hospital (YGH), New Yangon General Hospital (NYGH), Central Women Hospital (CWH), Yangon Children Hospital (YCH), Yangon Specialist Hospital (YSH), and Yangon Orthopaedic Hospital. There are two types of study population: patients and health care providers. Patient satisfaction towards hospital services were measured on different dimension of services including 1) admission and discharge services, 2) nursing care services, 3) clinicians' services, 4) diagnostic services and 5) physical facility by using 10 point visual analogue scale. A total of 684 patients were included in the study. Mean age of the patients from Yangon Children Hospital was 4.0±3.8 years while the mean age of the patients from other hospitals was 45.0±17.5 years. Lesser proportions of male than female patients were included in the study (44.7% and 55.3%). Duration of hospital stay ranged from 3 to 240 days and

median duration was 7 days. Just over 50% of patients had previous history of hospitalization. Majority of patients were come from Yangon Region (60.1%) while the remaining patients were from other states/regions. Out of 10 rating scores, overall admission and discharge services got a mean score of 8.7±1.9. Nearly 18% and 14.1% of patients rated a score of ≤5 on waiting time and waiting area respectively. Similarly, overall nursing care and clinicians' services got the mean scores of 8.7±1.8 and 9.3±1.3. Just over 11% of patients rated a score of ≤5 on explanation about procedures by nurses. Few patients (3-6%) rated a score of ≤5 to various dimensions of clinicians' services such as explanation about procedures, after care instructions, thorough examination, etc. Rating on diagnostic services got a mean score of 8.6±1.9 while 13.7%, 11.6% and 10.6% of patients rated a score of ≤5 on transport service, laboratory service and radiology service respectively. Overall physical facility of the hospitals got a mean score of 8.4±2.0. Among different physical facility, about one-fourth of patients (24.2% and 22%) rated a score of ≤5 on cleanliness of toilets and cleanliness of bathrooms. Moreover, 12.5% of patients rated a score of ≤5 on overall physical environment. Overall scores rated by the patients on each dimension of hospital services were calculated and categorize into low, medium and high score. Patients' ratings on five dimensions of hospital services are illustrated for each hospital in the following figures (Figure A to E). During focus group discussions, most patients expressed their satisfaction towards the clinical care services. Most patients stated that communication skill of doctors and nurses is very important for their satisfaction. They also highlighted the importance of thorough explanation about the procedures/tests and their diseases/conditions. Poor sanitation condition of hospital environment was one of the unsatisfactory conditions expressed by the patients. In one hospital, many patients pointed out the poor condition of cleanliness of the toilets and presence of bedbugs in the benches. In conclusion, most patients showed their satisfaction towards the clinical care services besides the poor sanitation conditions of toilets and wards, and poor physical facilities in some hospitals which needs further improvement.

1. COMMUNICABLE DISEASES

2.1. HIV/AIDS

2.1.1 Mindfulness-integrated reproductive health (Mind-RH) package for improving psychological behaviours and reproductive health knowledge among adolescents with parental HIV infection

Risks of psychological behaviour problems and limited reproductive health knowledge have been reported among adolescents, particularly in those with parental HIV infection. Sustainable and correct knowledge on reproductive health (RH) is essential for adolescents, particularly in the early stage of adolescence when abrupt physiological and mental changes occur. However, effective interventions are very limited. Therefore, an intervention study was conducted to assess the effectiveness of a mindfulness-integrated reproductive health (Mind-RH) intervention on adolescents' psychological behaviours, mindfulness status and reproductive health knowledge after the intervention. A group-randomized controlled trial was conducted among adolescents aged 10-16 years with HIV infected parent(s) using Mind-RH intervention package. The package included group mindfulness practice and participatory discussions on RH issues such as puberty, conception, adolescent pregnancy, contraception, sexually transmitted infections and HIV. Eligible adolescents from two townships were randomly assigned into intervention group and those from another two townships were assigned into control group. The intervention involved monthly group sessions for 3 consecutive months. Three domains of psychological behaviours, namely social, emotional and conduct behaviours, were assessed at baseline and

compared after 6-months. Knowledge on RH and mindfulness status were assessed at baseline, 3 months and 6 months. Multilevel regression analysis was used to determine the effectiveness of the intervention and influencing factors for both psychological behaviours and knowledge on RH. A total of 160 adolescents, 80 adolescents in each group, were included. The Mind-RH intervention significantly improved the emotional and conduct behaviours at 6 months ($p<0.001$). Mean scores of emotional behaviour (0.96±0.9 vs. 4.2±2.5, $p=0.001$) and conduct behaviour (1.45±1.1 vs. 2.79±2.0, $p=0.001$) were lower in intervention group which means they have less risk of developing behavioral problems. Among adolescents from intervention group, emotional (4.2±2.5 vs. 0.96±0.9, $p=0.001$) and conduct behaviour scores (2.9±1.9 vs. 1.4±1.0, $p=0.001$) were significantly improved when baseline and post intervention assessments were compared. The significant effect of the intervention existed after adjusting for gender, family type, child age and orphan status. Regarding mindfulness status, a significant improvement of mindfulness scores at 3 months was found and sustained at 6 months among adolescents from intervention group in comparing to those of control group ($p<0.01$). Univariate analysis showed significantly higher RH knowledge scores in the intervention group than in the control group at 3 and 6 months ($p<0.001$). After adjusting for family type, age and HIV status of the adolescents, knowledge scores increased at 3 and 6 months in both groups, but at a higher rate at 3 months for adolescents in the intervention group. Early adolescents, HIV negative adolescents and those from extended families had lower knowledge scores ($p<0.01$). An integrated package of mindfulness practice and participatory discussion on RH significantly improved the psychological behaviours, mindfulness and RH knowledge of adolescents with parental HIV infection at 3 months with sustainment at 6 months. Longer follow-up is required to evaluate the long-term impact of this intervention. Integration of Mind-RH intervention with other support programs is recommended to improve psychological behaviour and reproductive health knowledge of adolescents with parental HIV.

2.1.2 Assessment on cascade of prevention of mother-to-child transmission services received by HIV positive mothers during 2012 and 2014, Myanmar

As prevention of mother-to-child transmission (PMTCT) services are the key factors in improving maternal and child health (MCH) related to HIV, current assessment was conducted to find out the key bottlenecks of PMTCT programme by reviewing the cascade of services received by HIV positive mothers during 2012 and 2014, Myanmar. A mixed method design was applied which includes secondary data review and prospective data collection using qualitative research methods. Records of HIV positive pregnant mothers from 108 PMTCT sites in Myanmar during 2012 to 2014 were compiled, reviewed and analyzed to determine the situation of cascade of PMTCT services. Each record covered from the beginning of HIV testing of pregnant women till 18 months after delivery. In-depth interviews (IDIs) were carried out with providers from all levels and HIV positive mothers. A total of 3,372 records of HIV positive pregnant women were included in the assessment. Over one-third (35.3%, 1,191/3,372) of spouse were receiving HIV testing in which 61% were found positive. Nearly 59% (1,985/3,372) of HIV infected pregnant women received PMTCT according to the records. Among them, majority (85.6%, 1,699/1,985) received antiretroviral drugs for PMTCT during antenatal period. One third of HIV positive mothers (33%, 1,114/3,372) delivered their babies as normal vaginal delivery while 38.5% (1,297/3,372) were not recorded. Just over 47% (1,589/3,372) of children have received Nevirapine for prevention of transmission and 26% (890/3,372) have provided Cotrimoxazole. Records of 40% (1,361/3,372) of mothers were not documented about breast feeding option. Exclusive breast feeding was practiced by 30% (1,003/3,372) of women and 27.4% (924/3,372) did not

breast fed their babies. Nearly 25% (778/3,372) of the children received PCR test for early infant diagnosis (EID) of which 14% were detected as HIV positive. Just over 20% (658/3,372) completed antibody test and 12.4% were identified as HIV positive. Strengths, weaknesses and challenges of PMTCT program were discussed during IDIs with responsible providers. In particular, almost all providers acknowledged that PMTCT program in Myanmar is successful in terms of program expansion and area coverage. Many providers stated that coverage and implementation of PMTCT depends on MCH service accessibility, acceptability and attitude of Basic Health Staff (BHS) especially midwives. Some providers indicated that PMTCT services are disintegrated with routine MCH services implemented by midwives. With regards to client factors, attitude of pregnant women towards HIV was mentioned as one of the barriers for HIV testing. The problem of loss to follow up after referring the woman to hospital or tertiary centre was indicated as a common constraint. Weakness in integration with routine antenatal care services, limited human resource, over workload of midwives, weakness in monitoring and supervision, low education status of community at rural area, stigma and discrimination, frequent change in reporting format and lack of PMTCT data from specialist clinics were mentioned as the challenges of PMTCT services. Strengthening of integration with routine antenatal care (ANC) and fostering the motivation of midwives are suggested for successful implementation of PMTCT services. Furthermore, EID testing rate is very low and mothers should be encouraged to receive EID testing since it is very crucial for further care and treatment. Ensuring anti-retroviral prophylaxis to children is also suggested for reducing vertical transmission of HIV in Myanmar.

2.2 MALARIA

2.2.1 Readiness of malaria volunteers in malaria elimination: Preliminary study in Ayeyarwady Region

Readiness of malaria volunteers is one of the important factors to fulfill the target of Malaria elimination in 2030. A total of 172 Village Health Volunteers (VHV) (79 males and 93 females) from six selected townships (Ingapu, Lay Myatnar, Kyan Khinn, Yay Kyi, Myan Aung and Tharpaung) in Ayeyarwady Region participated in this study. The median age of VHV was 28 years (IQR 23-37). Majority of VHV (82%) attained middle or high school level of education. 92.4% of VHV have attended public volunteer training and 7.6% completed malaria course by non-governmental organizations (NGOs). 93% of VHV provide public health care. Concerning with malaria health services, 96.5% provided malaria diagnosis, 82.6% gave malaria treatment, 20.9% distributed long lasting insecticide nets (LLIN), 8.7% had KO tablets distribution, and 77.3% gave malaria health education. 96.5% provided on call services. 51.5% received a supervisory visit in last six months by public sectors. 97.1% had National Treatment Guidelines for malaria. 92.3% did not treat severe or complicated cases of malaria. 61.9% referred severe or complicated cases of malaria. Severe malaria cases (if encounter) were referred to station hospitals by 49.6%, and referred to township hospitals by 41.5%. Concerning knowledge on the treatment of uncomplicated malaria, 56.4%, 76.7% and 54.7% of VHV knew current recommended drugs for the treatment of uncomplicated *falciparum*, *vivax* and mixed malaria infections respectively. 55% have heard about activities in the past years to stop the spread of drug resistance malaria in Myanmar. 90.6% did not experience stock out any anti-malarial drugs in the past three months. 92.1% had malaria related summary graphs and tables displayed in record books. Among IEC materials, posters and leaflets were the most frequently used by VHV with 71.4% and 64.4% respectively. 99.4% knew Rapid Diagnostic Test (RDT) but 70.8% could not mention the brands of RDT. Nearly cent percent of VHV replied that results of RDT are

reliable. 98.8% replied that it is important to follow the guidelines of treatment. 60.9% used 1 to 5 RDT packs per month. 59.9%, 65.7% and 71.5% of VHV strongly perceived importance of RDT use in Artemisinin resistance containment, benefit of RDT use and confidence in using RDT in diagnosis of malaria respectively. 53.5%, 65.7% and 72.1% of VHV strongly perceived importance of Artemisinin based Combination Therapy (ACT) use in Artemisinin resistance containment, benefit of ACT use and confidence in using ACT in treatment of malaria respectively. Almost all of VHV have mobile phones and majority have touch screen tablets. 63.1% knew how to message via phones while 48.4% was able to use internet including social media. In current reporting system, 46.2% have difficulties in timely reporting especially in rainy season. The average time required to send monthly report to township health departments was usually 30 min to 1 hour and sent mainly by motorcycles. Nearly 65% of VHV perceived as convenient by sending monthly reports via mobile phones instead of using carbonless papers under favorable conditions. In conclusion, most of the malaria volunteers from all study sites were found as ready to be equipped in knowledge and skill to contribute in malaria elimination activities in Myanmar.

2.3 TUBERCULOSIS

2.3.1 Assessing cost-effectiveness of community-based ACF activities in Myanmar

International non-governmental organizations (INGOs) have been implementing community based tuberculosis (TB) care (CBTBC) in Myanmar since 2011. Although the National TB Programme (NTP) ultimately plans to take over CBTBC, there have been no evaluations of the models of care or of the costs of providing CBTBC in Myanmar by INGOs. The aim of this study is to describe the differences in provision of CBTBC, associated costs and cost effectiveness by the INGOs in Myanmar over the period of 2013 and 2014. This was a descriptive study using routinely-collected programmatic and financial data from four INGOs for the year 2013 and 2014. Data analysis was performed from the provider perspective. Costs for investigations were not included as it was provided free of charge by NTP to the TB patients and the procedures were similar for each model of care. We calculated the average cost per year of each programme and cost per patient completing treatment. Four INGOs assisted the NTP by providing CBTBC in areas where access to TB services was challenging. Each INGO faced different issues in their contexts and responded with a diversity of strategies; with the total costs ranging from US$ 140,754 to US$ 550,221 during the study period. The cost per patient completing treatment ranged from US$ 215 to US$ 1,076 for new cases depending on the targeted area and the package of services offered. Based on the effect estimates, treatment success rate (the proportion of new smear-positive TB cases registered under DOTS in a given year that successfully completed treatment, whether with bacteriologic evidence of success “cured” or without “treatment completed”) of INGO (A), (B), (C) and (D) were 78%, 65%, 72% and 83% respectively. Total costs were found to be the highest for INGO (A) and the lowest for INGO (B). However, the cost per patient completing treatment was found to be relatively higher for INGOs (B) and (C) than INGOs (A) and (D). Based on the study assessing involvement of community volunteers in TB control, the socio-demographic characteristics of the target population and population size of coverage areas of INGO (A) and INGO (D) are quite similar. But, INGO (D) spent less than INGO (A) per patient to complete treatment. Thus, INGO (D) appeared to show the allocation of their financial resources more patient-oriented. Previous qualitative and mixed methods studies conducted in Myanmar showed CBTBC model used by INGO (D) seemed more sustainable. INGO (D) achieved highest treatment success rate with lowest cost. Therefore based on the existing evidences the model used by INGO (D) was more cost effective than the others. The findings from this study may inform the NTP about the models

of community-based TB care and their associated costs. We recommend that standardized tools to evaluate the CBTBC performance should be developed and comprehensive evaluations, including the development of a model to estimate the cost of scaling up CBTBC country-wide should be carried out, especially as CBTBC activities are eventually to be taken over by the government. Finally, we suggest the models of CBTBC that have a high treatment success rate with low cost and higher sustainability potential and that allocate the largest share of their resources to patient-centered care should be supported.

2.3.2 Assessing patient satisfaction in community based TB care in Myanmar

This was a collaborative study among Department of Medical Research, National TB Programme and Save the Children and was conducted with the aim of eliciting the TB patients' satisfaction and factors influencing patients' satisfaction towards Community based TB care implemented in Myanmar. A cross sectional community based study was carried out in five townships in Myanmar where community based TB care has been implemented by INGOs. A total of 234 TB patients from five townships participated in this study. The mean age was 44±14.7 years. Male (132, 56.4%), married (162, 69.2%), Bamar (114, 48.7%) and rural residents (151, 64.5%) were the majority. The overall satisfaction score for community based TB care services in the study townships was just about to be satisfactory (3.9), based on the likert-scale ranging from 1 (highly unsatisfied) to 5 (highly satisfied) and denoted 4 as "satisfied". Patients were highly satisfied with communication with volunteers, volunteers' facilitation for TB diagnosis and TB treatment services. But the least satisfaction was reported for health education about TB. Patients' satisfaction was significantly higher among patients with high education status ($p=0.03$), urban residents ($p=0.001$), who received 1) home delivery of anti-TB medicines by the volunteers ($p<0.0001$), 2) more frequent health education ($p=0.004$), 3) DOTS provision by the volunteers ($p<0.0001$) and 4) transportation fees for patients' health facility visits ($p=0.04$). Qualitative findings also pointed out that patient satisfaction was determined by home delivery of anti-TB medicines by the volunteers, volunteers' psychological support and care on TB patients and getting anti-TB medicine free of charge. Our study highlighted that volunteer performance and the fundamental social support such as provision of transportation fees were the key factors for patient satisfaction in community based TB care. Therefore it is suggested to enhance volunteer performance and ensure continuous provision of fundamental social support to the TB patients. The provision of community based TB care should also ensure satisfaction of patients from rural area and non-schooling population. Improving patient satisfaction is important but it is not an exclusive factor to improve quality of care. Therefore, comprehensive evaluation of community based TB care programme including assessments such as economic evaluation and provider performance are also necessary.

SERVICES PROVIDED

ACADEMIC

Sr.	Name	Course	Responsibility
1	Dr. Thae Maung Maung	Research Methodology for PhD students at University of Medicine 1, Yangon	Lecturer
2	Dr. Thae Maung Maung	Structured Operational Research Training Initiatives (SORT-IT) Myanmar (second course), Nay Pyi Taw	Mentor
3	Dr. Thae Maung Maung	Workshop on Efficient Quality-assured Data Capture using Epidata, Shwe Ye Mon Hotel, Mandalay	Trainer
4	Dr. Wai Wai Han	Structured Operational Research Training Initiatives (SORT-IT) Myanmar (second course), Nay Pyi Taw	Mentor

MEDICAL STATISTICS DIVISION (POL)

Research Scientist	…	Dr. Myitzu Tin Oung MBBS(UMM), MA (Population and Reproductive Health Research) (IPSR, Mahidol University), MPH (Uo PH), Ph.D (Demography) (IPSR, Mahidol University)
Research Officer	…	Dr. Kyi Thar Min MBBS (UMMG)
Research Assistant (3)	…	Daw Mar Lar Aung BA (Business Management) (UDE)
	…	Daw Thandar Myint BSc (Hons), MSc (Mathematics) (MU)
Laboratory Attendant	…	Daw Pyae Phyo HtweB A (Geography) (UDE)
	…	U Bo Lin BSc (Mathematics) (Meiktila University)
	…	Daw Aye Mon San BSc (Mathematics) (UDE)
	…	U Ngwe Paw BA (Economics) (UDE)
	…	Daw Khin Yu Mon BA (Myanmarsar) (UDE)

Medical Statistics Division has been actively participated in conducting research projects in area of reproductive health and health information system. Statistical consultation, statistical analysis services are also provided to various researchers from other divisions.

RESEARCH PROJECTS

1. HEALTH POLICY AND HEALTH SYSTEMS RESEARCH

1.1 REPRODUCTIVE HEALTH

1.1.1 Sexual behaviour and contraceptive practices among adolescent university students in Mandalay District

The increase in proportion of sexually active adolescents and an insufficient use of effective contraceptive methods contributed to an increase in an unintended pregnancy, abortion and sexually transmitted infections (STIs) among adolescents. The objectives of the study are to assess the knowledge of and attitudes towards contraceptive use, to describe sexual behavior and contraceptive practice and to find out the factors associated with contraceptive knowledge, attitudes and practices of adolescent university students, aiming at improving adolescent reproductive health in Myanmar. A cross-sectional study was conducted using an anonymous, self-administered questionnaire with adolescents aged 16-19 years from six universities, three health-related and three non-health related universities situated in Mandalay District. A proportional probability to size (PPS) sampling was used to obtain the number of students required from each selected universities and individual students were recruited from selected universities using stratified random sampling (stratified by academic year and sex). A total of 850 students were included in the analysis. Many university students (85.6%) had moderate or high level of contraceptive knowledge but they had poorer knowledge about emergency contraception and female condoms compared to male condoms. Less than one-third could mention STI symptoms and about half had a good knowledge about factors predisposing to acquire STIs and prevention of STIs. Around two-third of students had less permissive attitudes towards premarital sex. Male adolescents and those who had more exposure to media especially internet and online social networks had higher level of contraceptive and STI knowledge and had more permissive attitudes towards premarital sex. Out of 850 students, 16.9% had sexual experience. The mean age of their first sexual exposure was 17.9 ± 1.7 years. The contraceptive use among adolescent students was

high (more than 75%) and was higher when they had sex with those who were not their regular partners (more than 90%). However, only 50% used contraception consistently. The higher percentage of students with better contraceptive and STI knowledge and those with more permissive attitudes towards premarital sex used contraception more consistently. About 20% of students or their partners who had had sexual exposure had been pregnant and approximately a third were unwanted and ended with miscarriage. Some of them (15.4%) experienced STI symptoms in the last year. The findings highlight the need for implementing programs which are able to promote consistent contraceptive use among adolescent university students for effective prevention of unwanted pregnancy, abortion and STI.

1.2 HEALTH INFORMATION SYSTEM

1.2.1 Assessment of death registration and mortality statistics in the Vital Registration System in Myanmar

In spite of the long-term establishment of the Vital Registration System (VRS) with fairly high geographical coverage, key mortality statistics in Myanmar are still estimated from very limited data that is of uncertain quality. This study evaluated the quality of mortality data and identified barriers to generating accurate mortality data from the VRS. It was a cross-sectional study with a mixed-method design that covered both secondary and primary data analysis. In secondary data analysis, the quality of mortality data generated from the VRS was assessed at the national level using the deaths registered into the 2013 VRS and the population data from the 2014 Myanmar Population and Housing census. The primary data was collected in two selected townships of Mandalay Region using qualitative methods such as document review, key informant interview and group interview. The aim was to explore the weaknesses in the system from administrative, technical and societal perspectives. The interviews were conducted with healthcare providers who are involved in the VRS in the study area, knowledgeable adults in the households who are permanent residents of the household regardless of experience of a death event in the household and from the households where a death event had occurred in the past three years and local administrators. The findings from the secondary data analysis suggest that the deaths were severely under-registered (around 40%) and the situation was worse in rural areas, in the youngest age group(under-five children) and in some states and regions such as Rakhine (13.6%), Shan (24.0%), Kachin (25.4%), Sagaing (28.8%) and Chin (29.0%) where transportation and accessibility to health centres were difficult. The quality of the cause-of-death data was questionable with a high proportion of ill-defined causes of death(22.3%) and possible over-reporting of deaths from non-communicable diseases (79.8% of all deaths with ‘proper’ codes). The qualitative data highlights weaknesses in the areas of administration, technical and public awareness and participation with regards to death registration, indicating needs to reform, restructure and reinforce the death registration system. In response to monitoring mortalities as mandated by the Sustainable Development Goals, a significant and sustained government commitment and investment in strengthening the vital registration in Myanmar is recommended.

1.2.2 Current situation, challenges and needs of mortality registration: A case study in Mandalay Region

The efficiency of a vital registration system (VRS) depends on many factors like the legal framework, system structure and design, registering procedures and process, human resources and technical efficiency and public awareness and participation. Understanding such factors can help identify limitations in the system and develop strategies to improve the system. This qualitative study explored the factors which undermine the ability of the system to

generate better quality mortality data. The data was collected in two purposively selected townships of Mandalay Region by using qualitative data collection methods such as document review, key informant interviews and group interviews. The study was conducted at the operational level of the VRS with healthcare providers, knowledgeable adults in the households and local administrators who played certain roles in death registration in the areas. Like other developing countries, the vital registration system in Myanmar has many weaknesses in the areas of administration (i.e. lack of a specific and adequate law for vital registration, absence of usefulness of certificates related to death registration issued by the health centre which currently serves as registration unit, no formal notification process for death events occurred in the community, lack of a systematic linkage among partner organizations), technical efficiency (i.e. absence of proper and regular on-the-job training related to death registration and cause-of-death certification for healthcare providers, lack of adequate knowledge related to death registration procedures and lack of awareness of importance of accuracy of data items among health care providers, ineffective cause-of-death practice for deaths occurred in the community and no routine data plausibility check at the local level) and public awareness and cooperation (i.e. low level awareness and participation for the community in death registration process). The findings highlight the areas of problems in the vital registration system which needs improvement and strengthening in support of formulation of strategies.

1.3 HIV/AIDS

1.3.1 Needs of clients and providers relating to quality HIV prevention and care services for key population

A qualitative study was conducted with purposively selected female sex workers (FSW), men who have sex with men (MSM) and intra-venous drug users (IVDU) from National AIDS Programme (NAP) and two International Non-Governmental Organizations (INGOs) in Mandalay, Lashio and Monywa. At least four clients from each key population were selected from both NAP and INGOs. In addition, key informant interviews were done with regional officers, administrative staff and technical staff from NAP and INGOs. All interviewees such as FSW, MSM and IVDU reported that the utilization of HIV/STI services was higher in their society. All providers reported that the utilization rate of diagnostic and treatment services among 10-24 years age group of key populations was increasing over trends and was more significant in INGOs but it was lower than that of adult population over 24 years old. During an outreach activity, the young key population had more exposure on using diagnostic and treatment services of HIV/STI services compared to adult group. Reasons for less utilization of HIV/STI services were clients' perspectives including perceived threats of having HIV/STI, overcrowding and less confidentiality at services and providers' perspectives including absence of peer, being shy and stigmatization, choice of provider and long distance to HIV/STI services. Clients created model HIV/STI service that they wanted to access regarding the location, structure, characteristics of staff and services available. The most favorable things among FSW, MSM and IVDU at HIV/STI services were confidentiality, privacy and good communication skills. While having enough counseling time is essential for FSW and MSM, skills of providers in treatment is important for IVDU. Diagnostic and treatment of HIV/STI is mainly provided at NAP. Diagnostic test for HIV/STI is available at INGOs but only a few INGOs provided treatment for STI. The NAP had enough drugs and test kits supply throughout the year but some INGOs at peripheral level had shortage of drugs and test kits. Although staff is enough for running day-to-day service, skillful staff are needed to initiate other activities such as mobile clinic, outreach activities and community based education program of HIV/STI services. To promote utilization of HIV/STI services among young and key population, it is

needed to have regular and frequent outreach activities, to organize one stop service with enough providers and drugs supply and to ensure favorable services for all.