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Pharmacy Services for Primary Service for Obstetric Neonatal Emergency at PHC in East Nusa Tenggara Province Indonesia

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Abstract

A study through an analysis of secondary data of National Health Facility Research of 2011 had been done cross-sectionally on PHCs in districts/cities in East Nusa Tenggara Province, Indonesia. Data were presented as distribution tables of PHC percentage according to personnel involved, availability and adequacy of medicines and usable health supplies. Appropriate availability and adequacy out of 18 medicines could be found on amoxicillin and captopril tablet, injections of dexamethasone, diazepam, oxytocin and vitamin K, infusions of glucose, Ringer lactate and NaCl 0.9%. Drugs with minimal availability were diazepam suppository, furosemide and sodium bicarbonate inj. The availability of all consumable health supplies were inadequate. Less than a quarter of PONED PHCs in NTT Province had appropriate pharmacy service and storage room. There were still pharmacy services conducted by incompetent personnel.

Keywords: *East Nusa Tenggara; Indonesia; Obstetric Neonatal Emergency; Pharmacy Services; Public Health Center*

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1. Introduction

Maternal mortality rate (MMR) and infant mortality rate (IMR) in Indonesia remain the highest in South East Asia. Indonesian Health Demographic Survey of 2007 showed that MMR in Indonesia was 228 per 100,000 live births (LBs) and IMR rate was 34 per 1000 LBs [1]. MMR of 306 per 100,000 LBs and IMR of 57 per 1,000 LBs in East Nusa Tenggara (*NTT*) Province were still higher than the national rate. However, there had been a significant decrease since 2004, when MMR was 554 per 100,000 LBs (307 per 100,000 LBs nationally) and IMR was 62 per 1,000 LBs (52 per 1,000 LBs nationally) [2].

Although various efforts have been conducted to decrease MMR and IMR, optimal and encouraging results have not been attained yet. Percentage of delivery assisted by traditional healer *(dukun)* was 46.1%, followed by consecutively midwife 36.5%, doctor 4.1%, other health personnel 1.2%, family 3.7% and others 0.5%. The results also showed that percentage of delivery at home was 77.7%, in government hospital 6.9%, others 6.7%, PHC 6.5%, village maternity home (*Polindes*) 3.5%, midwife's clinic 3% and private hospital 2.2% [3]. Reports from District/City Health Offices in *NTT* Province in 2008 stated that maternal deaths caused by hemorrhage were 123 cases (61%), by other causes 56 cases (28%), by infection 16 cases (8%), by hypertension 4 cases (2%) and by prolonged partus 2 cases (1%). Furthermore, 774 cases of newborn deaths were also reported, the greatest percentage were caused by other reasons (52.9%), followed consecutively by asphyxia (23.5%), by low birth weight (21.2%), by infection (1.1%) and by tetanus (0.5%) [3].

Mother and her newborn are very vulnerable to death, either for the reason of postpartum hemorrhage, asphyxia, sepsis or complication of preterm birth. The incidence can take place in hours or even minutes count if not appropriately treated and well-managed [4]. Most of maternal deaths (70%-80%) in countries with limited health resources or in developing ones resulted from eclampsia, postpartum sepsis, complication of abortion, hemorrhage, uterine rupture and obstructed labor [5,6].

East Nusa Tenggara *(NTT)* Province was one of the twelve provinces in Indonesia with a priority to reduce MMR and IMR besides West Java, Central Java, East Java, North Sumatera, Banten, DKI Jakarta, South Sulawesi, Lampung, South Sumatera, Papua and West Papua [7]. In order to reduce *MMR and IMR*, the grand strategy taken by Indonesia is Making Pregnancy Safer (MPS), where a variety of efforts that could be made to support the decline of MMR and IMR are assigned. One of the efforts is the procurement of Primary Service for Obstetric Neonatal Emergency *(PONED)* PHCs [8,9]. Here, health facilities ought to function well and need good quality medical technology, management including personnel, devices and medicines. Nevertheless, these are often overlooked [4]. In the province of *NTT* there is especially Mother and Child *(KIA)* Revolution program which aims to increase access and quality of maternal and infant health care in the whole area of District/City in East Nusa Tenggara province, the availability of adequate 24 hours health facilities which meet the standards from every aspect, i.e. the aspect of human resources, equipment, medicine, health supplies, buildings, health systems as well as budgeting. Maternal and child health revolution is accomplished through optimization of the fulfillment and the utilization of adequate health facilities, readiness for 24 hours and intended for health care of them [2].

PONED PHC is a hospitalized PHC with Primary Service for Obstetric Neonatal Emergency (*PONED*) ready for 24 hours to provide services to pregnant mother, labor and parturition and newborn complications, either

come in person or over the reference cadre/community, midwives in villages, PHCs and to refer unsolvable cases to *PONEK* hospital. *PONED* is performed in PHC under physician supervision [8,9].*PONED* PHC is a development of specialistic medical services in PHC in order to bring services nearer to the community in need. The development of *PONED* PHC should consider a wide range of personnel requirements and means that meet set standards. In addition to PHCs, *PONED* could be held in other health services that meet the requirements [9].

PONED PHC is expected to become the intermediate reference before the hospital to cope with emergencies that occur in pregnant women, childbirth and parturition. As has already been noted that one of the factors causing maternal death is the delay in referring to the hospital whenever there is an emergency. These delays are among others related to geographic conditions (9). The death of the mother and her baby often occurs due to complications that occurred during about childbirth, then intervention should be emphasized on activities to help secure delivery by skilled health personnel. Through good and appropriate assistance, complications may be detected early and immediately referred when needed [9].

Urgent actions that can be performed in executing *PONED* are manual placenta, curettage, ante and postpartum hemorrhage early treatment, stitching portio openings, bimanual compression and aorta, resuscitation for neonatal asphyxia, administering medicamentosa through umbilicalis veins, manual vacuum extraction for lower location (station of 0/0), treating of early pre eclampsia/eclampsia, handling of the shoulder dystocia, referring to hospital [10]. In *PONED*, midwives may give antibiotic injection, uterotonic injection, sedative injection, manual vacuum extraction of placenta [8].

Considering the above mentioned, *PONED* requires additional medicines, including psychotropic, narcotics and injections which need special management [11,12,13], and consumable health supplies other than those needed for primary health care, especially in *NTT* Province. National Health Facility Research in 2011 showed that the availability of medicines and consumable health supplies for *PONED* PHC were inadequate. In *NTT* Province most of PHCs (49.2%) had only about 20-39% of *PONED* medicines available [14]. To investigate these issues, a study to describe the performance of *PONED* PHCs in *NTT* Province was carried out.

2. Materials and methods

This study is a follow-up study through an analysis of secondary data of 2011 National Health Facility Research which was done cross-sectionally on PHCs in districts/cities in East Nusa Tenggara Province. All *PONED* PHCs in *NTT* were taken as samples. The objectives of this study are to obtain information on the characteristics of PHC and personnel involved, types of *PONED* treatment, distribution of *PONED* referral, availability, storage and conditions of medicines and usable health supplies, training of pharmaceutical service staff. Ethical approval was sought and granted from the Institutional Review Board of the National Institute of Health Research and Development of the Ministry of Health, Republic of Indonesia.

2.1 Limitations of the study

the adequacy of medicines and usable supplies cannot be correlated with PONED treatment conducted at PONED PHCs because they were used in general for all treatment done at PHCs and not merely for PONED treatment.

3. Results

3.1. Regional Characteristics

Table. 1. Characteristics of *PONED* PHC in East Nusa Tenggara Province

No	Characteristic	Number of PHCs (%) (n=59)	No	Characteristic	Number of PHCs (%) (n=59)
1	**PHC locus**		4	**Country Border area**	
	Urban	8 (13.56)		Border	3 (5.08)
	Rural	51 **(86.44)**		Non-border	56 **(94.92)**
2	**Remoteness**		5	**Travel time to *PONEK* hospital**	
	Very remote	6 (10.17)		≤ 1 hour	19 (32.20)
	Remote	25 **(42.37)**		> 1 - 2 hours	21 (35.60)
	Ordinary	28 (47.46)		> 2 hours	19 (32.20)
3	**Archipelago**		6	***PONED* working time**	
	Islands	3 (5.08)		< 24 hours	6 (10.17)
	Land	56 **(94.92)**		24 hours	53 (89.83)

Most *PONED* PHCs were in villages (86.44%), in very remote or remote areas (52.54%), on land (94.92%), not at the border area (94.92%) and took more than an hour to *PONEK* hospital.

Table 2. Distribution of *PONED* staff at *PONED* PHCs in East Nusa Tenggara Province

No	Description	Number of PHCs (%)
1	**Number of doctors**	
	>1	11 (10.64)
	1	37 **(62.71)**
	None	6 (10.17)
	Data unavailable	5 (8.47)
2	**Number of midwives**	
	>1	49 **(83.05)**
	1	4 (6.78)
	None	1 (1.69)
	Data unavailable	5 (8.47)
3	**Number of nurses**	
	>1	33 **(55.93)**
	1	8 (13.56)
	None	12 (20.34)
	Data unavailable	6 (10.17)

Most *PONED* PHCs had one doctor (62.71%), more than one midwife (83.05%), and more than one nurse

(55.93%). There were still *PONED* PHC without a single physician at all (10.17%), no midwife (1.69%) and without nurse (20.34%).

Table 3. *PONED* treatment conducted at *PONED* PHCs in East Nusa Tenggara in 2010

NO	Treatment	Number of treatments	Annual average*
1	$MgSO_4$ administration	920	16
2	Resuscitation	600	10
3	Curettage	202	3
4	Manual placenta	178	3
5	Vacuum extraction	35	1
	Total	1935	33

* rounding off

Overall numbers of treatment taken at *PONED* PHCs in East Nusa Tenggara in 2010 amounted to 1,935 with an average of 33 treatments per PHC. Most treatments conducted by *PONED* PHC in 2010 were $MgSO_4$ administration (920 or 16 treatments per PHC on average), resuscitation (600 or 10 treatments per PHC on average), whereas the most rarely performed treatments were vacuum extraction (35 or one treatment per *PONED* PHC averagely).

Table 4. Distribution of *PONED* referral cases in East Nusa Tenggara Province in 2010

NO	Description	Number of cases	Average*
1	Referred obstetric emergency cases	995	17
2	Referred neonatal emergency cases	204	3
3	Received obstetric case referrals	573	10
4	Received neonatal case referrals	112	2

* rounding off

Referred obstetric emergency cases in 2010 amounted to 995 cases or on average 17 cases per *PONED* PHC and referred neonatal emergency cases were equal to 204 which meant 3 cases per *PONED* PHC. Received obstetric case referrals were 573 cases and received neonatal case referrals were 112 cases, making a total of 685 received referrals.

*3.2. **Availability and adequacy of medicines and usable health supplies***

Basic emergency services which should be able to be carried out by a *PONED* PHC were manual placenta, curettage on incomplete abortion without complications with AVM, early treatment of ante and postpartum hemorrhage, stitching portio rupture, bimanual compression, manual vacuum extraction for lower location

(station 0/0), early treatment of pre eclampsia/eclampsia, fixing shoulder dystocia, treating neonatal asphyxia and referring to hospital.

There are more than twenty medicines needed for *PONED* services, i.a. injections ofmethyl ergometrine, oxytocin, vit. K, dexamethasone, ampicillin, pethidine, phenobarbital, diazepam, furosemide, Ringer's lactate, NaCl 0.9%, MgSO4 20 %, MgSO4 40%, dextrose and glucose in addition to oral or rectal medicines like tablets of metronidazole 500 mg, ferrous sulphate 600 mg, amoxicillin 500 mg, captopril 25 mg, nifedipine, calcium gluconate, epinephrine, sodium bicarbonate and diazepam rectal. Here, only 18 medicines are investigated and analyzed for the other six were not included in the National Health Facility Research of 2011, i.e. dextrose infusion, tablets of metronidazole 500 mg, ferroussulphate 600 mg, nifedipine, calcium gluconate, and epinephrine.

Consumable health supplies for *PONED* services consisted of: long gloves, 10 cc spuit, infusion set, plaster, Abbocath iv catheter No. 14 and 16, Foley catheter No. 22, urine bag, transfusion set, pediatric infusion set, wing needle No. 27, disposable nasogastric tube.

Table 5 below describes the availability, adequacy and expiration of *PONED* medicines at PHCs in East Nusa Tenggara Province in the year of 2010. Although amoxicillin tablet, dexamethasone injection and glucose infusion were available in all *PONED* PHC, they were still inadequate. Adequacy of amoxicillin was only 77.97%, of dexamethasone injection was 79.66 %, and of glucose infusion was 94.92%. Diazepam suppository was the least in availability (16.95%), followed by sodium bicarbonate 0.83mEq/ml injection (38.98%) and injection of furosemide (38.98%). The greatest percentage of expired medicines belonged to methyl ergometrine injection (20.34%), followed by vitamin K injection (13.56%) and dexamethasone injection (10.17%).

Table 5. Availability, adequacy and expiration of *PONED* medicines at PHCs in East Nusa Tenggara Province, 2010

No	Medicines	Availability (%)	Adequacy (%)	Expired (%)
Antibiotics				
1	Ampicillin injection	30 (50.85)	23 (38.98)	4 (6.78)
2	Amoxicillin tablet	59 (100.00)	46 (77.97)	5 (8.47)
Corticosteroids, narcotics				
3	Dexamethasone injection	59 (100.00)	47 (79.66)	6 (10.17)
4	Pethidine injection	28 (47.46)	20 (33.90)	4 (6.78)
Anticonvulsants, Hypnotics-sedatives				
5	Diazepam injection	49 (83.05)	44 (74.58)	4 (6.78)
6	Diazepam suppository	10 (16.95)	4 (6.78)	2 (3.39)
7	Phenobarbital injection	35 (59.32)	31 (52.54)	2 (3.39)
8	$MgSO_4$ 20 % infusion	28 (47.46)	32 (54.24)	5 (8.47)
9	$MgSO_4$ 40 % infusion	39 (66.10)	28 (47.46)	2 (3.39)
Diuretics, antihypertensive drugs				

10	Furosemide injection	23 (38.98)	13 (22.03)	4 (6.78)
11	Captopril tablet	51 (86.44)	43 (72.88)	2 (3.39)
Stimulants/uterine contraction inducer				
12	Methyl ergometrine injection	53 (89.33)	26 (44.07)	12 (20.34)
13	Oxytocin injection	48 (81.35)	39 (66.10)	6 (10.17)
Electrolytes				
14	Glucose infusion	59 (100.00)	56 (94.92)	5 (8.47)
15	Ringer' lactate infusion	57 (96.61)	41 (69.49)	3 (5.08)
16	NaCl 0.9 % infusion	56 (94.91)	46 (77.97)	3 (5.08)
Vit K injection, sodium bicarbonate injection				
17	Vit. K injection	53 (89.83)	37 (62.71)	8 (13.56)
18	Sodium bicarbonate 0.83 mEq/ml injection	23 (38.98)	11 (18.64)	0 (0.00)

Table 6. Availability and adequacy of *PONED* usable health supplies at PHCs in East Nusa Tenggara Province, 2010

NO	Usable health supplies	Availability (%)	Adequacy (%)
1	Long gloves	29 (49.15)	9 (15.25)
2	Spuit 10 cc	26 (44.06)	20 (33.90)
3	Infusion set	45 (76.27)	40 (67.80)
4	Plaster	42 (71.19)	35 (59.32)
5	Abbocath iv catheter no 14	18 (30.51)	15 (25.42)
6	Abbocath iv catheter no 16	21 (35.59)	20 (33.90)
7	Foley catheter no 22	32 (54.24)	22 (37.29)
8	Urine bag	21 (35.59)	15 (25.42)
9	Transfusion set	8 (13.56)	8 (13.56)
10	Pediatric infusion set	38 (64.41)	35 (59.32)
11	Wing needle no 27	33 (55.93)	30 (50.85)
12	Nasogastric tube	18 (30.51)	14 (23.73)

The highest availability percentage of usable health supplies at 59 *PONED* PHCs was infusion set (76.27%), followed by plaster (71.19%) and pediatric infusion set (64.41%), whereas the least was transfusion set (13.56%), nasogastric tube (30.51%) and Abbocath iv catheter No. 14 (30.51%).

3.3. Pharmacy service facilities in East Nusa Tenggara Province

A pharmacy facility can be said appropriate whenever there are electric supply within 24 hours, available clear and healthy water all year long, adequate ventilation, clean room and waste management with an incinerator. A

pharmacy storage room or warehouse should be equipped with medicines and health supplies rack as well as narcotics cabinet.

Table 7. Appropriateness of pharmacy facilities and storage room at *PONED* PHCs in East Nusa Tenggara Province

NO	Conditions	Sum (%)
1	Appropriate pharmacy service room	7 (11.86)
2	Appropriate pharmacy storage room	16 (27.12)

Only 10.61% *PONED* PHCs had an appropriate pharmacy service room and 25.75% *PONED* PHCs had an appropriate pharmacy storage room out of 59 *PONED* PHCs.

Table 8. Availability of narcotics cabinet and good drug management administration at *PONED* PHCs in East Nusa Tenggara Province

NO	Facilities	Sum (%)
1	Narcotics cabinet	21 (35.59)
2	Refrigerator	24 (40.68)
3	Good drug management administration	41 (69.49)

From a total of 59 *PONED* PHCs, the availabilities of both narcotics cabinet and refrigerator at *PONED* PHCs were still below fifty percent, on the other hand good drug management administration had been conducted at more than 50% *PONED* PHCs.

3.4. Competencies of pharmacy service staff at PONED PHCs in East Nusa Tenggara Province

To deliver good pharmacy services in *PONED* PHCs regarding the availability of medicines and their quality, good storage and adequate information, competent pharmacy service staffs have to be there. From Table 9 below, it is clear that pharmacy service staffs were not distributed evenly at *PONED* PHCs, and even there were still five *PONED* PHCs having pharmacy staff with no health education background at all.

Table 9. Competencies of pharmacy service staff at *PONED* PHCs in East Nusa Tenggara Province

NO	Pharmacy service staff education	Number of PHCs (%)
1	Pharmacist and Technical pharmacy staff	9 (15.25)
2	Technical pharmacy staff	23 (38.98)
3	Medic/paramedic	19 (32.20)
4	Others	5 (8.47)

The overall percentage of pharmacy service staffs that had no pharmaceutical background was rather high 40.67% (24 PHCs) and consisted of medic/paramedic staffs 32.20% and other staffs 8.47%.

Table 10. Training of pharmacy service staff at *PONED* PHCs in East Nusa Tenggara Province

NO	Training	Number of PHCs (%)
1	Drug delivery	15 (25.42)
2	Drug management	14 (23.73)
3	Rational use of drugs	15 (25.42)

Only 25.42% out of 59 *PONED* PHCs with pharmacy service staff that had ever been trained either on drug delivery or rational use of drugs and even less training on drug management (23.73%).

4. Discussions

4.1. Regional characteristics analysis

Characteristics of *PONED* PHCs in East Nusa Tenggara Province were as follows: the number of *PONED* PHCs was 59, they were mostly located in rural areas (87.88%). The number of *PONED* PHCs with travel time to *PONEK* hospital more than two hours was still high and this two hours' time needs to be shortened, for example by improving access or infrastructure or increasing the number of *PONEK* hospital. A proportionate ratio of the number of *PONED* facilities to populations and improved access can be vital to reduce maternal death [15]. In countries with high maternal death rates the majority of *PONED* facilities are not functioning properly at large or do not meet the requirements of a primary service for obstetric emergency facility [15,16]. There were still *PONED* PHCs without any physicians or nurses, and even there was one *PONED* PHC having no midwife (Table 2) at all. On the other hand, the requirements of *PONED* PHC, according to the Ministry of Health 2005, demand doctor, midwife and skilled nurse available for 24 hour [10] because pregnancy complications cannot be predicted in advance. *NTT* Province in its *KIA* revolution program stated that the standards of *PONED* PHC were among others two trained general practitioners (Normal Partus Care/APN, *PONED*, First aid for Obstetric Neonatal Emergency/PPGDON, Asphyxia, Low Birth Weight/*BBLR*, PI, ACLS), two trained midwives (APN, *PONED*, PPGDON, Asphyxia, *BBLR*, PI, *Basic Cardiac Life Support for paramedic*/BCLS), five trained nurses (BCLS, PI, PPGD and so on) as well as one pharmacist assistant [2]. A skilled workforce is essential to develop and perform effective *PONED* services and lack of them or minimal training was still found frequently, especially in rural or remote areas [15].

The percentage of twenty four hours *PONED* PHC was 80.30%, and certainly this could make *PONED* program not working optimally, or even worse, did not work at all, for obstetric and neonatal emergency cases were unpredictable previously. Besides the number of trained staffs, readiness to serve 24 hours a day in 7 days a week play an important role in decreasing maternal and neonatal deaths [4]. This situation, of course, will hinder the attainment of MDGs 2015 targets, i.e. the 4^{th} one that is reducing the under five years old children deaths as much as two thirds of the one in 1990 and the 5^{th} one that is maternal death decrease to 102 per 100,000 LBs from 228 per 100,000 LBs [3]. Meanwhile, *NTT* province has a target of maternal death of 153/100,000 LBs and infant mortality of 27/1,000 LBs by 2013 [2]. According to Indonesian Basic Health Survey (*SDKI*) of 2007

maternal and infant mortality rates in *NTT* province were consecutively 306/100,000 LBs and 57/1,000 LBs, higher than the national rates (228/100,000 LBs and 34/1,000 LBs). This was also mentioned by the World Bank (2010) that the trend of maternal death in Indonesia had pointed to the failure of grasping the 5th MDGs target [17].Furthermore, fast replacement of skilled health staffs, whilst recruitment was difficult, often occurred and the latest training was far behind. Maintaining sustainability of skilled personnel, especially in remote areas, was also said by A. Fauveau and F. Donnay [6].Results of Sri Handayani study in 2010 in Kendal District, Central Java, showed that the number of human resources were inadequate and they have not had *PONED* training yet before [18]. *Policy Brief* of Center of Health Service Management (*PMPK*), GadjahMada University (*UGM*) Medical Faculty, No. 8 of 2010 stated that facilities and infrastructures for maternal services were still inadequate or not optimally functioned and health personnel related to maternal service were not evenly distributed, lacking of competencies, uneven access and still providing inappropriate *PONED* services. Therefore, concrete actions to cope with these problems should be taken, for example conducting sustainable monitoring of *PONED* services, optimization of *PONED* functions, procurement of unavailable personnel needed, providing more intensive and comprehensive *PONED* training in collaboration with other sectors beside Health Office [8].The availability of *PONED* facilities and adequate skilled personnel should be maintained. Management support from the government is crucial for the effectiveness and sustainability of the training to improve quality [4]. So, strong government commitment, especially of local District Health Office, is important to improve the quality and quantity of health personnel. In this case, the role of Central Government, that is the Ministry of Health, is indispensable to procure physicians and to provide *PONED* training, especially in remote areas or where access to *PONEK* hospital is very difficult or it takes more than the two hours utmost time. There were 1,199 cases referred to *PONEK* hospital or on average 203 cases per PHC in 2010. *PONED* PHCs with travel time to *PONEK* hospital more than 2 hours have more strategic role in reducing maternal and infant mortality death when compared to *PONED* PHCs with greater access to *PONEK* hospital. Hence, provision of facilities and health personnel for *PONED* PHCs with longer travel time to *PONEK* hospital should be seriously prioritized and also in addition to areas with high maternal and infant mortality rates.

4.2. Availability and adequacy of medicines and usable health supplies

Not all *PONED* PHCs owned complete necessary medicines and usable health supplies to conduct *PONED* services (Table 5). Even though the performance of *PONED* program was not optimal yet and not so many cases of basic obstetric neonatal emergencies to be handled (33 cases per *PONED* PHC each year on average, Table 3), it didn't mean that the availability of complete required medicines was unimportant for cases of obstetric neonatal emergencies could not be predicted before. Available medicines at the time of *Rifaskes* 2011 were the ones procured in 2010 from many resources such as District Health Office, Provincial Health Office, and the Ministry of Health. In the meanwhile, coordination in between the three fund resources was not optimal yet and resulted in untimely and unnecessary medicines procurement which in turn might make them expired. Furthermore, stocks have to be well managed in order to maintain accurate availability of medicines such that whenever availability falls below a certain level, it can be soon replenished [4,16]. Government policy intervention is also needed to ensure completeness and availability of medicines [15]. Supportive policy from each government level is a must, either from the central, provincial or regional one. Other medicines and some consumable health supplies like long gloves and spuits were unavailable or out of stock. Table 5 and 6 show more comprehensively that not all *PONED* PHCs had their medicines complete and adequate. Good availability

(>80%) and good adequacy (>60%) out of 18 medicines could be obtained from only 9 items, i.e. amoxicillin and captopril tablet, injections of dexamethasone, diazepam, oxytocin and vitamin K, infusions of glucose, Ringer lactate and NaCl 0.9%. The availability of methyl ergometrine injection was 89.33 %, but its adequacy was only 44.07%, whilst 20.34% of them was already expired. Methyl ergometrinewas needed in manual placenta and curettage on incomplete abortion without complications with AVM, whereas in *NTT* province in 2010, according to *Rifaskes*, 178 cases of manual placenta and 202 cases of curettage were found. Poorer availability (<40%) happened to diazepam rectal, furosemide injection for early treatment of pre eclampsia and eclampsia and sodium bicarbonate injection for treating asphyxia. Therefore, further investigation and evaluation to obtain more suitable and efficient mechanisms of timely *PONED* medicines procurement as needed and in adequate number have to be done. Good coordination among District Health Office, Provincial Health Office and the MoH is important to avoid out of stock or excessive stock of one or more drugs in a location. The most often treatments done by *PONED* PHCs were $MgSO_4$ administration, resuscitation, curettage, manual placenta and vacuum extraction. The availability of all kind of usable health supplies was less than 80%.

The low availability of medicines and usable health supplies indicated that *PONED* program not optimally ran in addition to the inappropriate human resources and facilities. Results of *PONED* implementation analysis in Kendal District in 2010 showed that besides the inadequacy of human resources in number and quality as mentioned above, in *PONED* PHC improper communication (no inter-sectoral market socialization, incomplete organization structure), facilities and infrastructure that did not met minimal standards, same distance to PHC and hospital, no special fund for *PONED* program were still found[18]. Results of the study in three districts in East Java found that obstacles in *PONED* program were mainly coordination and supporting policy in field implementation [19].So, the sustainability of *PONED* PHC includingtheavailability of medicines and consumablehealthsuppliesrelymuchonthecommitment of Health Office and *PONED*programexecutives in PHC.

The low availability of medicines and usable health supplies will much influence the success of *PONED* program, because the incidence of complication is difficult to predict such that medicines and health supplies should be on hand in adequate number and complete every time needed. By 2008 in Indonesia, direct causes of maternal death related to pregnancy and labor were mainly hemorrhage (28%), besides eclampsia (24%), infection (11%), prolonged partus (5%), and abortion (5%) [9]. In those cases, the most needed medicines were NaCl 0.9% or Ringer lactate infusion, ampicillin injection, phenobarbital/diazepam injection or rectal, antihypertension like captopril, $MgSO_4$, furosemide injection, oxytocin injection, ergometrine injection. Though the availability of NaCl was good (94.91%), it was still inadequate (77.97%). The availabilities of equipment or supplies like infusion set, Abbocath, plaster for $MgSO_4$ administration, were still inadequate and consecutively 76.27%, 30.51% for Abbocath no. 14 and 35.59% for no 16, and 71.19% for plaster. It will be more vital for remote areas and/or far *PONEK* hospital (travel time more than 2 hours). Monitoring and evaluation should be done at least once in three months [16].

The study in three districts in East Java also stated that to overcome lack of medicines might be done by prescribing so as to obtain medicines outside the PHC [19]. Nevertheless, this surely cannot be done in areas far from a dispensary or take much time to get to it. It should be bear in mind that emergencies need prompt actions.

Without needed medicines, *PONED* team cannot function properly and the goal of decreasing MMR/IMR will not be achieved optimally.

4.3. Facilities and infrastructure of pharmacy service in East Nusa Tenggara Province

Only a small number of *PONED* PHCs have appropriate facilities for pharmacy services, including for storage. Good room condition for pharmacy service was only found in 10.61% and appropriate storage room condition in 25.75% PHCs (Table 8). Percentage of distinctive cabinet for narcotics and refrigerator was still lower than 50%, namely 33.33% and 37.88% (Table 9). Law of narcotics states that narcotics must be stored in a special place and defiance from the law can be punished (8).The availability of refrigerator is also important, for a number of *PONED* medicines like injections have to be stored at certain temperature lower than room temperature. Each drug may need certain storage condition and may be different for other preparation of drug, for example amoxicillin tablet should be stored in a temperature controllable room (air conditioned room), oxytocin injection should be stored at 2-8 centigrade in a refrigerator, and ampicillin injection should be maintained not to freeze [20]. Improper storage may deteriorate drug quality and decrease its effectivity, become ineffective or even worse become toxic and causing death. Remembering these drugs are crucial, they have to be given in good quality as soon as possible, for example medications for curettage on incomplete abortion, early treatment of ante and postpartum hemorrhage, early treatment of pre eclampsia/eclampsia such as ergometrine injection, oxytocin injection, NaCl 0.9% infusion, Ringer lactate infusion, ampicillin injection, phenobarbital/diazepam injection, furosemide injection and calcium gluconate. As already mentioned above, direct causes of maternal death related to pregnancy and childbirth were mainly hemorrhage (28%).

East Nusa Tenggara Province with its *KIA* revolution has set *PONED* PHCs' standards regarding room facilities, i.a. the existence of a dispensary room and storage room for medicines, solutions and other usable supplies [2]. However, these could not be fulfilled in all districts/cities in *NTT* province (Table 8 and 9).

4.4. Competencies of pharmacy service personnel in PONED PHCs in East Nusa Tenggara Province

Not in all *PONED* PHCs, pharmacy services were provided by pharmacist or pharmacy technician. There was still 34.85% pharmacy service done by paramedics or even by staffs who had no health science background (Table 10) and this could be found not only in rural or remote areas. Medicines should be specifically managed and may be differently for each medicine, therefore competent personnel, i.e. pharmacist or pharmacist assistant were needed. As described above, drug mishandling or improper storage may lead to negative effect on human health. Besides, it is surely not in line with the existing regulations which state that drug dispensing and delivery on physician's prescription should be done by a pharmacist, and in remote areas where pharmacists may be unavailable, the Minister of Health can place pharmacy technician at primary health care like PHC. Referring to Narcotics Law No. 35 of 2009 and Psychotropic Law No. 5 of 1997, these conditions are also against the law [9,10]. Actually, in *KIA* revolution the *NTT* Province had set the standard of health staff to manage medicines in *PONED* PHCs to be one pharmacist assistant or undergraduate/D-3 [2].

In addition to appropriate competencies obtained from formal education, adequate training was also needed. Table 11 shows that training ever received by pharmacy staffs in *PONED* PHCs was minimal. Training either in

drug dispensing or rational use of drugs were only obtained by pharmacy staffs in 25.42% *PONED* PHCs, whilst drug management training was only in 23.73% PHCs.

5. Conclusions

Only half of drug preparations had good availability and adequacy, i.e. amoxicillin andcaptopril tablet, injections of dexamethasone, diazepam, oxytocin and vitamin K, infusions of glucose, Ringer lactate and NaCl 0.9%. In spite of its good availability (89.33%), methyl ergometrine injection adequacy was not enough (44.07%), and the expired drug found was high (20.34%). Availability less than <40% were found for diazepam suppository, furosemide injection and sodium bicarbonate injection. The availability of all consumable health supplies were inadequate. Appropriate pharmacy service room were only 11.86 % and good storage room were 27.12%. Narcotics/psychotropic cabinets were only owned by 33.33% *PONED* PHCs and refrigerator for storage of special medicines by only 37.88% PHCs. There were still pharmacy services conducted by incompetent personnel (pharmacy staffs), and even by staffs that had no health education background at all (12.12%).

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