Health Status of Stateless Children in Tak Province, Thailand

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ABSTRACT

Purpose

Statelessness is the worst possible form of violation of fundamental human rights which can lead to serious adverse health outcome in children. The purpose of this study is to assess the association between insurance affiliations and health status of stateless children in terms of incidence of pneumonia compared to Thai children with the universal coverage scheme (UCS), and the uninsured children.

Design/methodology/approach

The study used medical records of children aged 0-15 years who were admitted to four selected district hospitals in Tak Province from January 1, 2013 to December 31, 2017. Multivariate logistic regression was applied with binary outcome data (pneumonia: yes/no). Exposure was three types of insurance while covariates were the age, sex, and domicile of the children.

Findings

Of 8,167 hospitalized children between 2013 and 2017, 1,668 were identified who were diagnosed with pneumonia. The risk of pneumonia was 1.7% higher in the stateless children than in the uninsured children (adjusted odds ratio [AOR]=1.017, 95% confidence interval [CI]=[0.527,2.080];p= 0.960). The risk of pneumonia was 13.2% higher in the UCS children than in the uninsured children (AOR=1.132,95% CI=[0.613,2.233];p =0.706). Results remain similar after sensitivity analysis.

Social implications

The incidence of pneumonia, after adjusting for covariates, were similar for children with Stateless Insurance compared to uninsured, suggesting that health insurance might not be a good predictor of health status of vulnerable children especially in presence of multiple health interventions for uninsured and/or undocumented children in Tak. **Originality/value**

The study has discovered that the age and domicile of children are independent predictors of incidence of pneumonia in Thailand. Despite similar benefit package, the Stateless Insurance seems to have greater effect than the UCS as the risk of pneumonia is found to be much lower among the Stateless insurees compared to the UCS beneficiaries.

Keywords: Pneumonia; Stateless insurance scheme; Stateless children; Electronic medical records; Tak Province; Thailand

Introduction

Stateless person is defined as "a person who is not considered as a national by any State under the operation of its law" (Batchelor, 2005). Statelessness is the worst possible form of violation of fundamental human rights (Institute on Statelessness and Inclusion, 2014). Without any nationality, stateless persons may have difficulty in accessing a wide range of human rights including civil, cultural, economic, political, education, and healthcare (Edwards and Van Waas, 2014). The violations of human rights can lead to serious health outcomes as the health and human rights are inextricably intertwined (World Health Organization, n.d.). In Thailand, stateless people are defined as nationals without a birth registration document stating Thai citizenship and who have been residing in the country for generations especially along Thai-Myanmar border area (Archavanitkul, 2011, Suphanchaimat et al., 2016a). There are over 2-3 million unregistered stateless persons who are at risk of statelessness in Thailand (Rakkanam, 2017). The stateless persons are denied the right to vote, travel, own property, work legally, and have access to education and healthcare (Rakkanam, 2017, The Thailand Project, 2014). Consequently, the stateless children are unable to receive a formal healthcare services unlike Thai children in the country. Lack access to healthcare among children might deteriorate their health status that could eventually impede greater human development. In this study, the health status is measured in terms of incidence of pneumonia among children in the country.

Pneumonia is the inflammation of the tissue in one or both lungs which is usually caused by a virus or bacterial infection (MSD, 2019, NHS, 2019). Globally, pneumonia is the leading cause of death in infants and under-5 children (Pratheepamornkull et al., 2015, Nguyen et al., 2017). There are an estimated 150 million episodes of childhood pneumonia per year and 7-13% of them are hospitalized (Turner et al., 2013a). Recent estimates show that pneumonia

accounts for 16% of under-5 child deaths in the world (William, 2018). In the Pacific region, over 75% of pneumonia deaths occurred in six countries, including Cambodia, China, Laos, Papua New Guinea, the Philippines, and Vietnam (Nguyen et al., 2017). In Thailand, stateless children are particularly vulnerable with vaccine preventable diseases such as pneumonia due to lower coverage of immunization (Canavati et al., 2011, Kaji et al., 2016, Williamson et al., 2017).

Previous research demonstrates that the incidence of pneumonia among under-5 children is high in rural provinces in Thailand (Fry et al., 2010, Lu et al., 2016, Piralam et al., 2015, Simmerman et al., 2009). The incidence rates of pneumonia are highest among children under one year old, followed by children between 1-4 years old in the country (Fry et al., 2010). Empirical evidence shows a high incidence of pneumonia in young children in the Maela Refugee Camp along the Thailand-Myanmar border (Turner et al., 2013a, Turner et al., 2013b). Pratheepamornkull et al. (2015) explored the seasonality of pneumonia cases associated with environmental factors in Chiang Mai Province using time-series models that predicted the average monthly incidence of pneumonia was 1.17 times smaller than the real number of pneumonia cases. Pratheepamornkull et al. (2015) suggest that young and preterm (premature) infants with community acquired pneumonia (CAP) are at high risk for developing serious complications by virus infections at Chonburi Hospital in eastern Thailand. Williamson et al. suggest that the risk of a vaccine preventable diseases (VPDs) requiring hospitalization is strongly correlated with lack of vaccination among ethnic minorities such as the Amish in Pennsylvania State (Williamson et al., 2017). This phenomenon is comparable with the stateless population in Thailand.

The Thai Cabinet introduced the "Health Insurance for People with Citizenship Problem (HI-PCP)" scheme ('Stateless Insurance' hereafter) in 2010 to increase health service utilization including routine immunization among the stateless population without catastrophic spending (Suphanchaimat et al., 2016a). The benefit package the stateless insurance scheme is comprehensive and quite similar to that of the universal coverage scheme (UCS) for Thai citizens, including outpatient and inpatient services, health promotion and disease prevention, and high-cost care (Suphanchaimat et al., 2016b). However, previous studies suggest that the health service utilization is consistently lower among the stateless insurees compared to the UCS Thai population (Suphanchaimat, 2017, Suphanchaimat et al., 2016b). Nevertheless, none of the prior studies looked at the health status of stateless children in terms of the incidence of pneumonia in Thailand.

The purpose of this study is to assess the association between the incidence of pneumonia in children and three insurance affiliations: the stateless insurance, the UCS and the uninsured. Uninsured children are those who are the children of undocumented or irregular migrant workers in the country, mainly from neighbouring countries, such as Cambodia, Myanmar, Lao PDR, and Vietnam, without health insurance. They are supposed to pay out-of-pocket (OOP) and/or enjoy fee waiver, if cannot afford their medical bills from humanitarian grounds, at the government health facilities. Uninsured are coded in the health database as 8200, 8400-8406, 9100 (Supplementary file-2). To estimate the association between exposure and outcome, the study applied multivariate logistic regression analysis using five full-year electronic medical records of children aged 0-15 years from four selected district hospitals in Tak Province.

Methods

Data sources

The study used an electronic medical database (popularly known as "43-files database"). The data is hosted by the Bureau of Planning and Strategy (BPS) under the Thai Ministry of Public Health (MOPH). The BPS has been collecting administrative data for the purpose of reimbursement and health service utilization since 2007 (Saokaew et al., 2015). The required data for this study was retrieved from January 1, 2013 to December 31, 2017 through the Provincial Public Health Office (PPHO) in Tak Province.

Study design, setting and participants

The study applied a retrospective study design (Kanchanomai et al., 2015) with five full-year electronic medical records from four district hospitals in Tak Province. Tak Province is in the north of Thailand along the Thai-Myanmar border. Four border district hospitals, namely Mae Ramat, Phop Phra, Tha Song Yang, and Umphang, were selected for the study based on the high concentration of stateless people in the province (Jitthai et al., 2010). The study included children aged 0-15 years who had a hospital admission between January 1, 2013 and December 31, 2017. International Classification of Diseases, Tenth Revision Thailand Modification (ICD10-TM) codes (Pakphayun Hospital, n.d.) were used to identify hospitalized children diagnosed with pneumonia (Skull et al., 2008, Williamson et al., 2017). The study population was limited to three insurance types (uninsured, stateless, UCS) while a total of six types of insurance appeared in the raw dataset. The corresponding insurance codes were used to identify the three insurance types as recommended by Tak PPHO (Supplementary file-1).

Variables

Three sets of variables were used in the analysis: outcome variable, exposure variable, and covariates/confounders. The outcome variable was the incidence of pneumonia (ever had pneumonia) during the study period. The exposure variable was the three levels of insurance status (uninsured, stateless, UCS). Note that the UCS children are the most common comparable group as used in the previous research (Suphanchaimat et al., 2016b). The key covariates, namely age (years), sex (male/female), and domicile (districts) were used as confounders. Table 1 displays a detailed description of the outcome, exposure, and confounders used in the quantitative analysis.

[INSERT TABLE 1 HERE]

Statistical methods

The Chi-square test was applied to determine statistical significance between three exposure groups on a categorical variable (Hoskin, 2012). The multivariable logistic regression was applied for the binary outcome variable (occurrence of pneumonia: yes/no). The model tested the association between insurance status and outcome taking confounders into account which is crucial in statistical modeling with observational data (Cochran, 1968). Goodness of fit and model specification were tested by the Likelihood Ratio test (LRT). All statistical analyses were done using R version 3.5.3 (R Core Team, 2019). This study was reviewed and approved by the Naresuan University Institutional Review Board (COA No.039/2019, IRB No. 1035/61, dated 23 January 2019).

Data access and cleaning methods

As requested, the PPHO provided data only for those children aged between 0-15 and who had been admitted to any of the four selected district hospitals for inpatient care between January 1, 2013 and December 31, 2017. Therefore, the electronic medical records of children were primarily filtered and cleaned at source. The PPHO also provided corresponding code files linked to the raw data to be recoded for further analysis. As such, the researchers recoded variable value levels to create exposure, and domicile or permanent residence variables (Supplementary files-1&2). Regarding the outcome, to identify pneumonia episodes, multiple principal diagnosis codes that appeared in the dataset were filtered for all-cause of pneumonia cases among hospitalized children using recommended ICD10-TM codes (Skull et al., 2008).

The exposure variable (insurance affiliation) was cross validated by checking the first digit of redacted 13-digit national identification number that should have corresponded to the respective insurance affiliations. For instance, as recommended by the PPHO, the insurance code “83XX” should correspond to national ID “0XX” to be stateless insurance (Supplementary file-3). After crosschecking, the researchers found that the insurance affiliation codes perfectly corresponded to the respective national identification numbers. Thus, the researchers validated the reliability of classification of insurance status which was the key variable for data analysis. Duplicated observations and other insurance beneficiaries, namely civil servant medical benefit scheme (CSMBS), social security scheme (SSS), and traffic were dropped from the data analysis. Additionally, within the study population who changed insurance status, namely UCS to uninsured and vice-versa, were dropped to avoid misclassification of exposure (Suphanchaimat, 2017). Finally, newborn admissions were dropped from the analysis as they were not admitted for any childhood diseases. The common identifiers for linking between data files were 100% complete. However,

researchers performed sensitivity analysis by repeating the multivariate analyses with all children including newborn admissions (Coker et al., 2012, Thabane et al., 2013).

Results

Participants

Of 8,167 hospitalized children (after excluding 2,357 new-born admissions), the researchers identified 1,668 children diagnosed with pneumonia during 2013 to 2017. The youngest group (0-1year) accounted for approximately 29% of all patients while this figure varied for subsequent older groups: 2-3year (~20%), 4-5year (~12%), 6-10year (~20%), and 11-15year (~19%). Approximately 55% of all hospitalized patients were males. The highest proportion of patients was drawn from Mae Ramat Hospital (51%) followed by Tha Song Yang (~21%), Umphang (~20%), and Phop Phra (~8%) from respective districts.

Descriptive statistics of hospitalized patients

Table 2 compares personal attributes of hospitalized patients by their insurance affiliations: the uninsured, the stateless, and the universal coverage scheme (UCS). It shows that the majority of the hospitalized patients belonged to the UCS (~92%), followed by the stateless (~7%), and the uninsured patients (~1%). Similarly, the proportion of pneumonia patients was the highest in the UCS group (~21%) followed by the stateless (~18%) and the uninsured (~17%) hospitalized children. The greatest proportion of hospitalized children was under two (0 -1year) in all insurance types. The proportion of males outnumbered the females in all beneficiary types. The largest proportion of admissions took place in Mae Ramat Hospital of the Mae Ramat district for the stateless and the UCS while the uninsured were mostly admitted to the Tha Song Yang Hospital of the Tha Song Yang district (Table 2).

[INSERT TABLE 2 HERE]

220

221 ***Outcome data***

222 Table 3 displays all-cause of pneumonia cases among hospitalized children using
223 recommended ICD10-TM codes. It shows that the majority of the pneumonia patients
224 belonged to the UCS, 1552 of 1,668 (~93%), followed by the stateless, 103 of 1,668 (~6%),
225 and the uninsured patients, 13 of 1,668 (<1%). As mentioned earlier, the proportion of
226 pneumonia patients was the highest in the UCS group. Researchers also observed that (not
227 shown in the table) the incidence of pneumonia varied by age groups. Around 57% of the
228 youngest group (0-1year) were diagnosed with pneumonia which was the highest followed by
229 2-3years (~42%), 4-5years (~20%), 6-10years (~8%), and 11-15years (~2%).

230 [INSERT TABLE 3 HERE]

231

232

233 ***Main results***

234 Multivariate logistic regression was performed with the binary outcome variable. Table 4
235 displays the regression results in terms of crude odds ratio (OR) and adjusted odds ratio
236 (AOR). The risk of pneumonia was 1.7% higher in the stateless children than in the uninsured
237 children without statistical significance. The risk of pneumonia was 13.2% higher in the UCS
238 children than in the uninsured children but it was not statistically significant. The children
239 aged 2-3 years were associated with a reduced risk of pneumonia when compared with their
240 younger counterparts (0-1 year). The risk of pneumonia was found to be progressively lower
241 among the older children compared with their younger counterparts aged below two. Female
242 children were at 2.5% higher risk of pneumonia compared to their male counterparts without
243 statistical significance though. The children living in the newer districts, such as Phop Phra
244 (AOR= 0.273, 95% CI=[0.194, 0.373]; p<001), Tha Sing Yang (AOR=0.797,95%

CI=[0.689,0.21]; p=002), and Umphang (AOR=0.815, 95% CI= [0.698, 0.949]; p=009) were associated with a reduced risk of pneumonia compared with those living in an older district such as Mae Ramat (Table 4).

[INSERT TABLE 4 HERE]

In a sensitivity analysis (not shown), the multivariate regressions analyses were repeated using all children who visited the hospitals including new-born admissions as they might affect the analysis. However, results were similar to the analysis with the sample of excluding new-born children. Insured children were more likely to have a diagnosis of pneumonia compared to uninsured but without statistical significance. For instance, the risk of pneumonia was approximately 2% higher in the stateless children than in the uninsured children (adjusted odds ratio [AOR]=1.02, 95% confidence interval [CI] = [0.54,2.07]; p= 0.944). The risk of pneumonia was 18% higher in the UCS children than in the uninsured children (AOR=1.18,95% CI = [0.65,2.31]; p =0.602).

Discussion

Key results

The study has shed light on the association between insurance affiliations and the occurrence of pneumonia in children aged 0-15 at four selected district hospitals in Tak Province. The study applied multivariate logistic regression with binary outcome data. The results suggest that the all-cause pneumonia in children does not differ significantly by their corresponding insurance affiliations. The stateless insurees have 1.017 times higher risk of pneumonia than the uninsured patients after adjusting for the effect of potential confounders. The children with the universal coverage scheme (UCS) were found to be at higher risk of pneumonia (13.2%) than the stateless children (1.7%). The youngest group (0-1year) of all hospitalized

children were found to be with higher risk of pneumonia as they were more frequently diagnosed with pneumonia. In contrast, older children especially those who are two and above were found to be at lower risk of pneumonia with statistical significance. The incidence of pneumonia was found to be the highest in Mae Ramat district which is the oldest district amongst the four selected districts in Tak Province. Comparing with the oldest district, the newer districts were found to be with reduced risk of pneumonia with statistical significance. Figure 1 displays the factors associated with pneumonia in children by odds ratio (OR) and adjusted odds ratio (AOR) in descending order where AOR provides a more reliable estimate with robust standard error (Knol et al., 2012).

[INSERT FIGURE 1 HERE]

The top ten most common principal diagnoses among hospitalized children show that the pneumonia was the most frequent vaccine preventable diseases (VPDs) in all beneficiaries. Out of all-cause pneumonia, four major types of pneumonia were more common among hospitalized children, including the unspecified pneumonia (69% of all cases), bacterial pneumonia (14%), Broncho pneumonia (13%), and Lobar pneumonia (3%) (Table 3).

Interpretation

The above findings were consistent with similar studies conducted in Thailand. Turner et al. found a high risk of pneumonia in young children (OR=2.37, 95% CI=1.56,3.59) in the refugee population in the Maela Refugee Camp in Tak Province (Turner et al., 2013b, Turner et al., 2013a). Fry et al. (2010) reported that the risk of hospitalized Respiratory Syncytial Virus (RSV) pneumonia among children under-5 was high in rural Thailand. Similarly, age below one year (AOR=13.2, 95% CI=7.7,22.5) and 1-4 years (AOR=8.3, 95%CI=5.0,13.9) were independent predictors of RSV pneumonia in the country (Fry et al., 2010). Another domestic study by Lu et al. (2016) demonstrated that the risk of radiographically confirmed pneumonia in young children under-5 was substantially larger (2,394/100,000 person-years)

in two rural provinces (e.g. Sa Kaeo and Nakhon Phanom) in Thailand. Simmerman et al. (2009) also found that the average annual risk of influenza pneumonia was greatest in children under-5 (236 per 100,000) in two rural provinces (e.g. Sa Kaeo and Nakhon Phanom) in Thailand.

The researchers observed that, unlike older children (age four and above), the proportion of pneumonia admissions amongst the uninsured children under one year old was higher than that of both the stateless and the UCS insurees. This phenomenon might not necessarily mean that the uninsured older children did not experience pneumonia. There might be some policy implications to be explained. According to the Thai Ministry of Public Health a migrant child aged less than 7 years old is eligible to buy a health insurance card at the cost of 365 Baht (USD11.46) per child per year, while a child aged between 7 and 15 years old is required to buy the same card at 2,200 Baht (USD69.11) which is the annual premium for adults. This might serve as a financial barrier to attaining insurance and most migrant parents might not be willing or able to buy expensive insurance for their children at an adult price (Suphanchaimat, 2017). Another reason might be the clandestine status of low-skilled migrants (e.g. illegal/undocumented, 'fear of arrest'), who are mostly from Myanmar, was found to be the most common barrier to accessing childhood immunization programmes (Canavati et al., 2011, Kaji et al., 2016, Prakunwisit and Areesantichai, 2015).

The current study is also consistent with the results of other similar studies though context is different. For instance, Duffy et al. (2018) found no significant difference in health status (e.g. dental caries) among for children aged 2-19 years by their insurance affiliations: public insurance, uninsured, private insurance, in the US. Similarly, Coker et al. (2012) found no significant difference between insured children with persistent symptoms to have a diagnosis

of asthma and uninsured children with similar symptoms in the US. They argued that children with persistent symptoms might have a higher level of need for acute asthma care regardless of their insurance status. Although, Celhay et al. (2019) found that public healthcare insurance scheme (e.g. SMSXXI) was associated with a reduction in late (e.g. over 28 days) neonatal mortality, the insurance was not associated with early (e.g. less than one week) neonatal mortality in Mexico.

As mentioned earlier researchers did not find significant difference between uninsured and insured groups of children regarding effect of exposure on outcome. This may indicate that the exposure (e.g. health insurance) does not always have impact on desired outcome (e.g. incidence of pneumonia among children). In other words, the results suggest that type of health insurance is not a strong predictor of health status (pneumonia in this case) once age, sex, and domicile are controlled for. There are a few plausible practical explanations for this insignificant difference as follows. First, the authors analyzed secondary data of those children who visited hospital for inpatient care. As such, short duration of data with small proportion of undocumented children which might be cause of this insignificant difference (Suphanchaimat et al., 2016b). Secend, the Provincial Public Health Office (PPHO) allows all children, regardless of their legal status, to be immunized at free of cost. Uninsured children might take the benefit of this local initiative along border provinces (Suphanchaimat, 2017). Third, undocumented migrants are sometimes exempted from healthcare charges at the discretion of local providers from humanitarian grounds but enjoy the same quality healthcare services as insured groups (Tangcharoensathien et al., 2017). Finally, there is a private social enterprise initiative known as '*Dreamlopments*' that initiated the Migrant Fund (M-Fund) in 2017 along the Thai-Myanmar border districts including Mae Sot, Mae Ramat, and Php Phra

in Thailand. It is a voluntary, low-cost, and non-profit health insurance scheme that acts as a safety-net initiative for protecting the health of undocumented or illegal migrants in the country (Pudpong et al., 2019). It is likely that though undocumented children were covered by this insurance but categorized as uninsured in the hospital database.

These above policy initiatives/interventions might improve children's health service utilization and health outcomes of children regardless of insurance status. For instance, a recent study in Thailand suggests that vaccination rates between Thai and migrant children in the Thai public schools are similar, while personal hygiene behaviours and nutritional statuses are indifferent between Thai children and migrant children in either Thai primary schools or migrant learning centers (Tuangratananon et al., 2019). However, the present study suggests that the risk of pneumonia is relatively higher among younger children, which could be an economic burden for Thailand in the future unless some pragmatic policy measures have been taken to reduce the incidence of pneumonia among under-5 children. Empirical evidence from Vietnam, a neighbouring country of Thailand, shows that the average treatment costs per patient of pneumonia among children under-5 varied from USD180 to USD318) depending health sector and societal perspectives respectively (Le et al., 2014).

Limitations

The study has several important limitations. First, the most critical disadvantage of using routinely collected health data is a lack of information on the study (participants) patients (in this case children) who failed to show up at the district hospitals. This issue can be addressed only by collecting primary data at the household level on the health-seeking behaviour of the

study population. Second, facility-based health data do not track individual patients across the facilities via unique identifier (e.g. 13-digit unique ID in Thailand). The researchers addressed this problem by using personal identification number (PID) which is unique within the hospital. Thus, same individual might be considered distinct individuals if he/she would visit different hospitals for care. Finally, the data had quite a short time trend with a limited number of stateless and uninsured children, compared to the UCS children. This might be a reason for difference in outcome without statistical significance (Suphanchaimat et al., 2016b).

Generalizability

The primary concern is the lack of generalizability of the findings for all stateless children in the country as the study population was drawn from only four district hospitals in Tak Province. Additionally, results may not be generalized for all non-Thai children as the stateless children is just one group among many non-Thai populations in the country, such as legal and undocumented/illegal migrant children, international students, children of diplomats, and refugees who are unique from each other based on its own characteristics (Suphanchaimat et al., 2016b).

Conclusion

In conclusion, this is probably the first study to investigate the association between the health insurance affiliation of children and incidence of pneumonia among children in Tak Province, Thailand. The risk of pneumonia was found to be 1.7% and 13.2% higher in the stateless children and the UCS children respectively when compared with the uninsured children. However, this difference did not show statistical significance. Age and domicile of children were independently associated with the incidence of pneumonia in children.. The incidence of

pneumonia, after adjusting for covariates, were similar for children with Stateless Insurance and UCS insurance compared to uninsured, suggesting that health insurance might not be a good predictor of health status (pneumonia in this case) of children in presence of multiple healthcare services for the uninsured children who are mainly children of undocumented or irregular migrants in the country. In other words, some essential vaccination services and health promotions are offered to all children irrespective of their legal status in Thailand, which might reduce disparities in health status of all children including uninsured children.

Although benefit package of two insurance schemes: Stateless Insurance and UCS, are quite similar, the risk of pneumonia was found to be much greater in UCS beneficiaries (~13%). than stateless insurees (~2%) compared to uninsured children, suggesting that the Stateless Insurance seems to have greater effect than the UCS in reducing pneumonia. Additionally, the greater prevalence of pneumonia among children under-2 demands for pragmatic health policy initiatives, such as coordinated and integrated health promotion and prevention, to reduce the risk of early childhood diseases including pneumonia and healthcare cost in the future.

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Declaration of conflicting interests

The authors declared no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

Research ethics and patient consent

This study was reviewed and approved by the Naresuan University Institutional Review Board (COA No.039/2019, IRB No. 1035/61, dated 23 January 2019).

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