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Analysis of degree of regional health considering disaster risks

Y. Tamamori[(1)], M. Fujiu[(2)], S. Nakayama[(3)] , J. Takayama[(4)], K. Hirako[(5)]

[(1)] *Master Course Student, Kanazawa University, ytamamori.331.kk@gmail.com*
[(2)] *Assistant Professor, Ph.D., Kanazawa University, fujiu@se.kanazawa-u.ac.jp*
[(3)] *Professor, Dr., Eng., Kanazawa University, nakayama@staff.kanazawa-u.ac.jp*
[(4)] *Professor, Dr., Eng., Kanazawa University, takayama@staff.kanazawa-u.ac.jp*
[(5)] *Research Assistant Professor, Organization of Frontier Science and Innovation, Kanazawa University, hirako@staff.kanazawa-u.ac.jp*
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Abstract

In Japan, a lot of natural disasters are expected to occur such as typhoon, heavy snowfall, flood, sediment disaster, earthquake, tsunami and volcanic eruption. Problems that Japan has includes the super aging society.

The aging of Japan progressed to the world at speed not to watch an example and invited super aging society in 2007. With it, people in need of long-term care increase. Such examples people with special needs to disaster suffered from by natural disaster occur frequently, and it is found by natural disaster that we find security, the relief of these people. At disaster, it is expected that people who are behind with evacuating increase. In considering the disaster prevention measures of our country, we cannot ignore distribution of people with special needs to disaster in the future. Research results on dealing with the elderly and people with disabilities as people with special needs to disaster has been done, but research results on dealing with diabetic patients, artificial dialysis patients, and psychiatric and neurological disease patients as people with special needs to disaster has not been done. No studies to understand the distribution of people with special needs to disaster using National Health Insurance database (KDB). In this study, using National Health Insurance database (KDB), we clarify distribution of the patient according to each disease and clarify distribution of people in need of long-term care. I grasp the place where the elderly and people in need of long-term care live in by these analyses and a kind suffering from of illness and consider it from the viewpoint of medical care to future disaster prevention measures.

In this study, we analyzed about people in need of long-term, patients requiring high medical costs, and artificial dialysis patients using the data of the National Health Insurance database (KDB). By using National Health Insurance database (KDB), we visualized addresses of people in need of long-term level three or more care, diabetic patients, psychiatric and neurological disease patients, and artificial dialysis patients in Nanto City on GIS. Furthermore, by using the J-SHIS Map, we visualized the distribution of seismic intensity (JMA-scale), which is 2% in 50 years exceedance probability in Nanto City on GIS. Instrumental seismic intensity, which is 2% in 50 years exceedance probability in Nanto City are distributed from seismic intensity upper 5 to seismic intensity 7 (JMA-scale), seismic intensity is greater in the north of Nanto City. Although there is little place of seismic intensity 7 (JMA-scale) in Nanto City, most of people with special needs to disaster are living in places where seismic intensity upper 6 (JMA-scale). It was found that the proportion of those who are living in close from the main medical institutions in people with special needs to disaster is high. It is important to clarify for each residence shelters for each residence because major medical institutions are built close together in Nanto City.

Keywords: National Health Insurance database (KDB), super aging society, disaster prevention measures, medical care, senior citizen

1. Introduction

In Japan, a lot of natural disasters are expected to occur such as typhoon, heavy snowfall, flood, sediment disaster, earthquake, tsunami and volcanic eruption. People with special needs to disaster refer to the people in need of assistance in evacuation in disaster. For example, the elderly, people with disabilities, victims, infants, stranded commuters, travelers, artificial dialysis patients, diabetic, patients suffering, psychiatric and neurological disease patients, and people in need of long-term are people with special needs to disaster. Diabetics are people with special needs to disaster because diabetic may lead to metabolic disorders in the event of disaster even if their conditions are stable in peacetime.

In this study, we analyzed about people in need of long-term, patients requiring high medical costs, and artificial dialysis patients using the data of the National Health Insurance database (KDB).

We analyzed data of the National Health Insurance database (KDB) of Nanto City. Nanto City is located in the southwestern part of Toyama Prefecture. The area of Nanto City is 668.64 square kilometers. The population of Nanto City is 53582 people (2015 of March 31). In age three segment population of Nanto City, young population (0-14 years old) and the working-age population (15-64 years) has reduced, and the elderly population (over 65 years) has increased. Nanto City has aging populations. In November 2004, four towns and four villages merged into Nanto City.

Figure 1 shows Toyama Prefecture and each cities.

Figure 2 shows previous four towns and previous four villages in Nanto City.

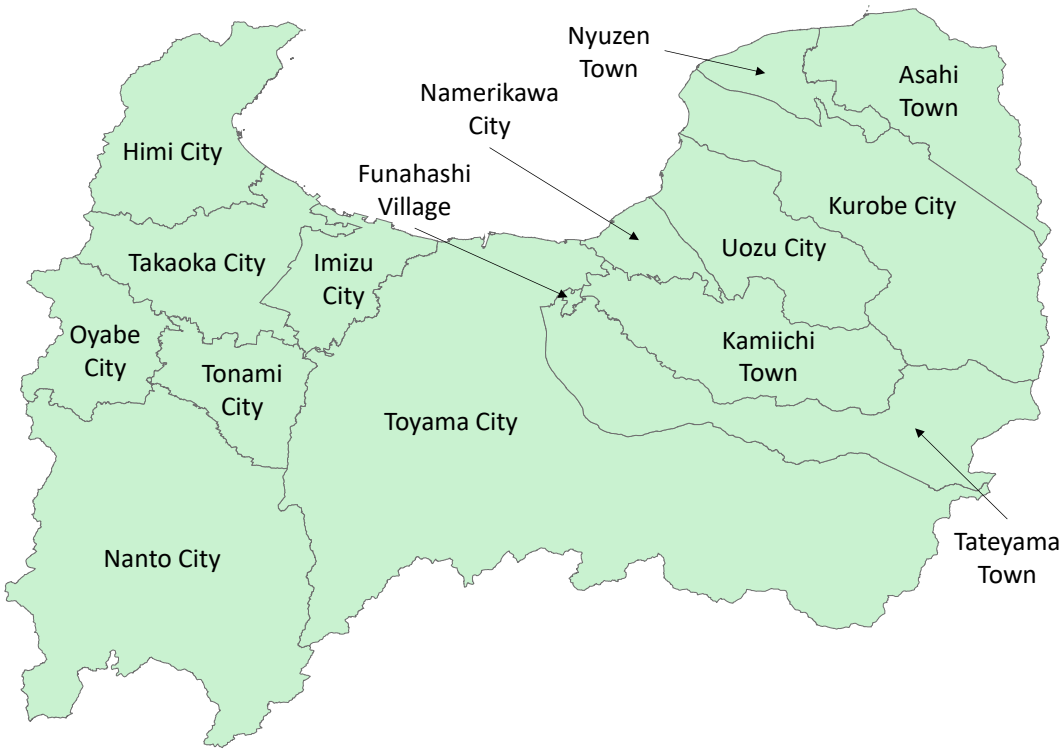

Fig. 1 – Toyama pref. and each cities

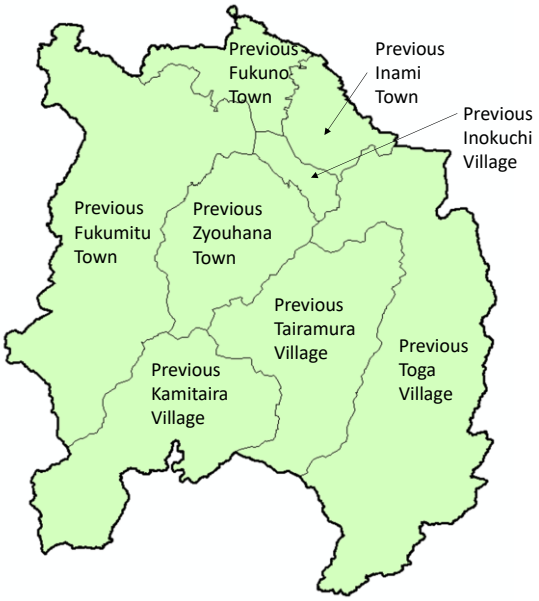

Fig. 2 – Previous four towns and previous four villages in Nanto City

2. Overview of National Health Insurance Database (KDB)

Previously data preparation for grasping the current area situations and health problems were often done by hand work, and it was inefficient. It was difficult to sufficiently understand the current area situations and health problems because the data was huge. It is possible to do a lot of work automatically, it is possible to implement a more efficient and effective health service with National Health Insurance database (KDB) system. By using this system, people can share not only information but also recognized health problems in the region. As a result of using National Health Insurance database (KDB), a lot of health problems can be examined. Figure 3 shows example of the data of National Health Insurance database (KDB). KDB has gender, age, date of birth, address, expenses, main disease name and so on.

被保険者番 氏名(カナ) 画面個別項目1 画面個別項目 画面個別項目 画面個別項目 画面個別項目 画面個別項目 画面個別項目7
費用額:300,000円以上 主病名:

性別	年齢	生年月日(元	生年月日(新	住所	入院外来区分	費用額	高血圧症	糖尿病	脂質異常症	高尿酸血症	虚血性心疾患	(再)バイパス	大動脈疾患	脳血管疾患	動脈閉塞性	主病名	2番目に高い	3番目に高い	4番目に高い	5番目に高い	6番目に高い	個人番号
男	68	S21	10	富山県南砺	入院	8,667,770	●	●			●	●	●	●		その他の僧	虚血性心疾	その他の心	その他の血	症状、徴候	その他の呼	11014
男	71	S18	9	富山県南砺	入院	2,684,590	●	●		●	●	●				虚血性心疾	その他の心	その他損傷	糖尿病	症状、徴候	腎機能障害(	10393
女	62	S27	10	富山県南砺	入院	2,201,130										骨折	その他の足	熱傷及び	鼻その他の	その他の	腎機能	3767
男	61	S28	6	富山県南砺	入院	2,143,810	●		●	●	●					その他の心	虚血性心疾	高血圧性疾	その他の内	アルコール	胃潰瘍及び	2403
男	68	S21	10	富山県南砺	入院	1,939,160	●		●		●					虚血性心疾	その他の心	高血圧性疾	その他の内	その他の理	由による保	15224
女	73	S16	1	富山県南砺	入院	1,877,340										関節症						2469
女	73	S16	8	富山県南砺	入院	1,818,170			●		●			●		関節症	その他損傷	骨の密度及	症状、徴候	その他の	脈その他の	14717
女	72	S17	8	富山県南砺	入院	1,743,620										関節症						5372
女	74	S15	3	富山県南砺	入院	1,667,680	●									骨折	高血圧性疾患					16080
男	66	S23	2	富山県南砺	入院	1,515,040					●					直腸S状結	その他の消	その他の悪	虚血性心疾患			16770
男	64	S25	8	富山県南砺	入院	1,480,790										直腸S状結	腸移行部及び	直腸の悪性新生物				1334
女	74	S15	5	富山県南砺	入院	1,378,480										乳房の悪性	その他の急	性上気道感染症				12764
女	73	S16	7	富山県南砺	入院	1,350,590										その他の腎	腎機能障害(	その他の	腹痛症及び	貧血		9083
男	74	S15	8	富山県南砺	入院	1,296,020	●									その他の悪	高血圧性疾患					12836
男	68	S20	12	富山県南砺	入院	1,264,440										その他の悪性新生物						3356
男	68	S21	3	富山県南砺	入院	1,263,900										その他の腎	その他の腎尿路系の疾患					16235
男	73	S16	8	富山県南砺	入院	1,183,030	●									結腸の悪性	直腸S状結	その他の悪	喘息	慢性副鼻腔	高血圧性疾	5457
男	69	S20	1	富山県南砺	入院	1,170,460	●	●	●							悪性リンパ	症状、徴候	喘息	糖尿病			9960
男	63	S25	12	富山県南砺	入院	1,145,360		●								直腸S状結	症状、徴候	アルコール性肝疾患				7017
女	71	S18	9	富山県南砺	入院	1,122,080	●	●	●		●			●		権間板障害	腎機能障害(	その他の心	虚血性心疾	その他の	洋喘息	13517
男	63	S26	6	富山県南砺	入院	1,111,120										その他の血	その他の洋	胃潰瘍及び	胃炎及び十	症状、徴候	急性気管支	4752
女	40	S49	6	富山県南砺	入院	1,058,620	●								●	その他の呼	症状、徴候	喘息	その他の	後高血圧性	甲状腺障害	8509
男	72	S17	1	富山県南砺	入院	1,054,240										その他の洋	胃の悪性新	直腸S状結	結腸の悪性	その他の	新症状、徴候	3225
女	69	S20	2	富山県南砺	入院	1,034,850	●									気管、気管	その他の	炎症性多発	胃潰瘍及び	その他の	洋高血圧性疾	7609
男	69	S20	1	富山県南砺	入院	1,020,740	●									脳内出血	その他の	高血圧性疾患				14788
男	67	S21	12	富山県南砺	入院	1,003,400										その他の	その他の	男前立腺肥大(症)				5876
男	62	S27	2	富山県南砺	入院	1,001,180	●		●	●	●			●		腎機能障害(	その他の	虚血性心疾	その他の	脂動脈硬化	その他の	16069
男	73	S16	2	富山県南砺	入院	999,320	●									良性新生物	胃の悪性新	ウイルス肝	腎不全	高血圧性疾	その他損傷	12066
女	20	H06	7	富山県南砺	入院	973,130										その他の	その他の	消化器系の疾患				17133
女	56	S32	12	富山県南砺	外来	950,450										その他の	気管、気管	その他の	洋胃炎及び	十頭脈症候	その他の	6572
女	74	S15	10	富山県南砺	入院	932,730										骨折						10994
男	68	S21	10	富山県南砺	入院	931,020	●							●		脳梗塞	前立腺肥大	胃潰瘍及び	その他の	その他の	腎尿路系の	1746
男	73	S16	3	富山県南砺	入院	929,850	●			●						その他の	頭蓋内損傷	その他損傷	血管性及び	詳細不明の	認知症	11966
男	69	S20	1	富山県南砺	入院	920,330										その他の	気管、気管	腎不全	その他の	消化器系の	疾患	14664
男	70	S19	10	富山県南砺	入院	878,120	●							●	●	その他の	脳梗塞	肺炎	その他の	心てんかん	高血圧性疾	13926
男	66	S23	7	富山県南砺	入院	872,440	●	●						●		脳内出血	白血病	その他の	洋腹痛症及び	てんかん	その他の心	3476
男	73	S16	1	富山県南砺	入院	866,830	●							●		脳梗塞	症状、徴候	腎盂腎炎	その他の	その他の	脈硬化症	1491

Fig. 3 – Example of the data of National Health Insurance database (KDB)

3. Previous Researches

A research result on disaster contingency planning dealing with the elderly as people with special needs to disaster has been presented by Mr. Namba et al. A research result on evacuation dealing with the elderly and people with disabilities as people with special needs to disaster by Ms. Ariga.

Research results on dealing with the elderly and people with disabilities as people with special needs to disaster has been done, but research results on dealing with diabetic patients, artificial dialysis patients, and psychiatric and neurological disease patients as people with special needs to disaster has not been done.

No studies to understand the distribution of people with special needs to disaster using National Health Insurance database (KDB).

4. Earthquake Risk of People with Special Needs to Disaster in Nanto City

4.1 Earthquake risk of people in need of long-term

Certification of Needed Long-Term Care is intended to determine the necessary level of care service. Therefore, there is a case in which seriousness of the disease and the level of the care do not always coincide. Certification of Needed Long-Term Care is divided into seven levels of support required 1-2 and care levels 1-5.

We analyzed people in need of long-term level three or more care as people with special needs to disaster because people in need of long-term level three or more care cannot do by themselves. This study was targeted for people in need of long-term level three or more care from June 2012 to February 2015.

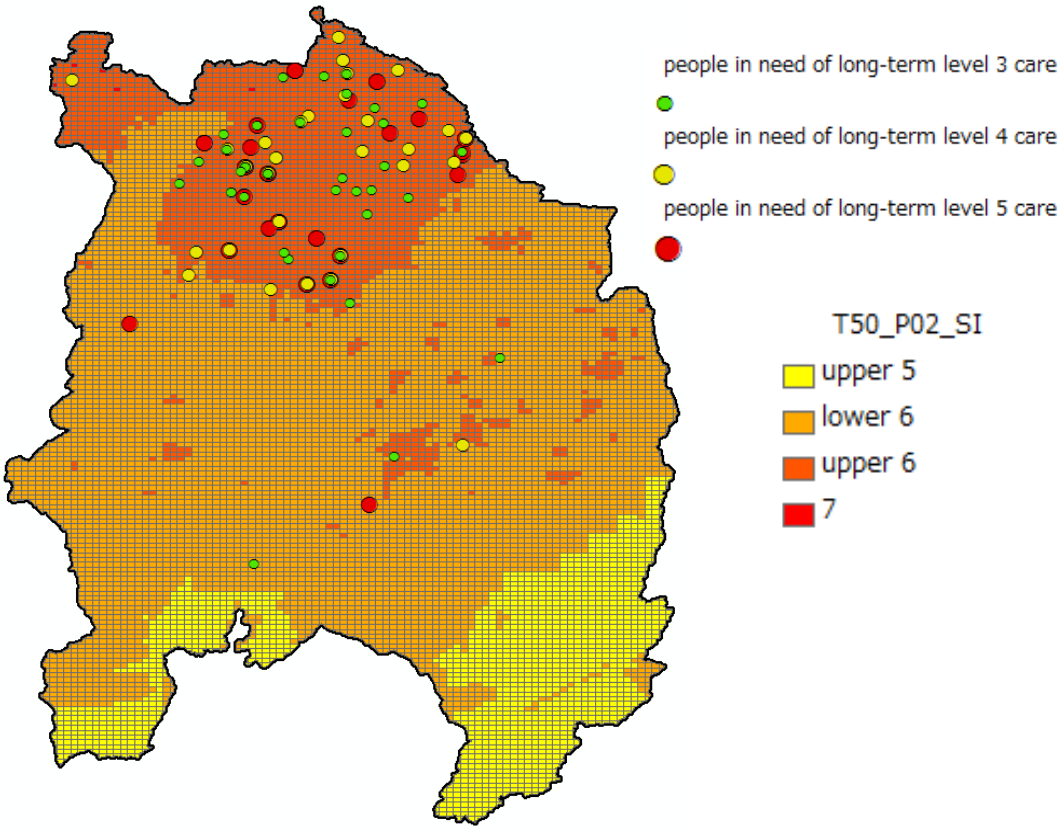

Fig. 4 – Distribution of need of long-term level 3-5

Figure 4 shows that people in need of long-term level three or more care and of measuring seismic intensity (JMA-scale) which is a 2% under 50-year exceedance probability distribution. Figure 5 shows that relationship between need of long term and seismic intensity (JMA-scale). From figure 4 and 5, it can be seen that most living in places where seismic intensity of upper 6 (JMA-scale) and at any care level despite residence of people in need of long-term level 3-5 care is different.

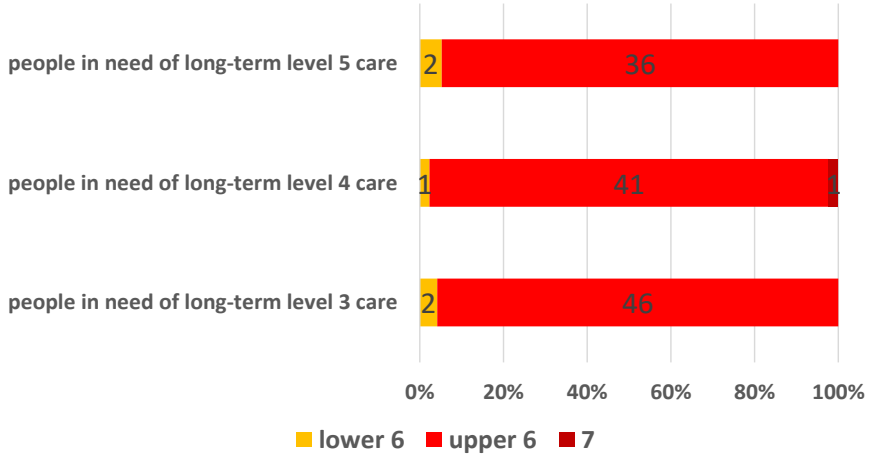

Fig. 5 – Share of need of long-term level under seismic intensity

Figure 6 shows that the distribution of people in need of long-term level three or more care and the distance (km) from major medical institutions of Nanto City. Figure 7 shows that the distance from major medical institutions of people in need of long-term level three or more care.

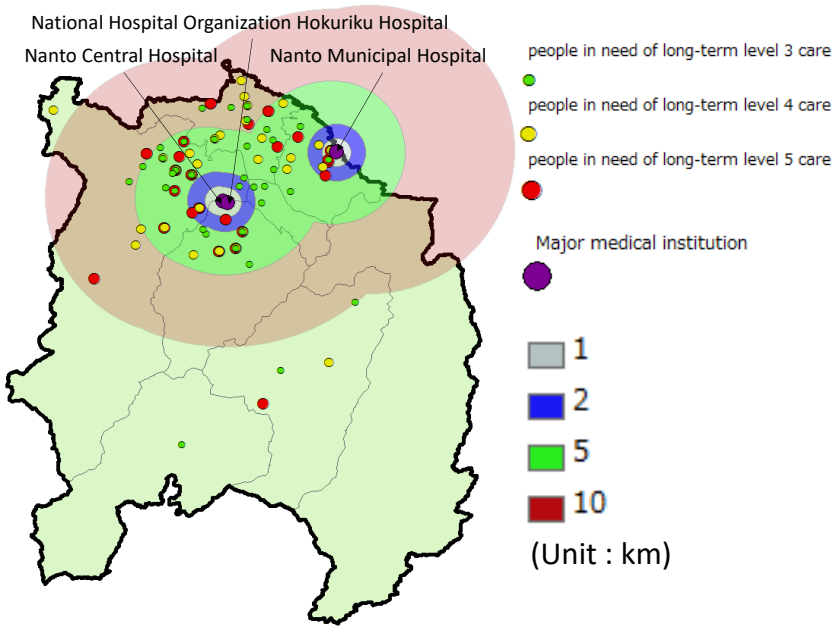

Fig. 6 – The distribution of people in need of long-term level 3-5 care and the distance (km) from major medical institutions of Nanto City

From figure 6 and 7, the proportion of people in need of long-term level three or more care living in 5km distance from major medical institutions is high. Therefore, there is concern that the evacuation due to traffic congestion is delayed during the disaster.

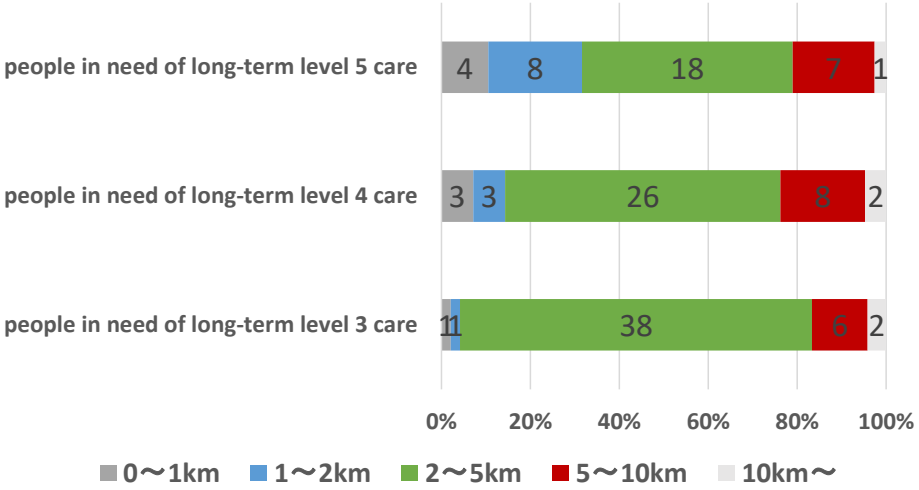

Fig. 7 – The distance from major medical institutions of people in need of long-term level 3-5 care

4.2 Earthquake risk of patients to be determined as people with special needs to disaster

This study was intended for diabetic patients, psychiatric and neurological disease patients, and artificial dialysis patients from June 2012 to February 2015. It is only a patient in need of medical expenses of more than ¥ 300,000 in one month for diabetic patients and psychiatric and neurological disease patients.

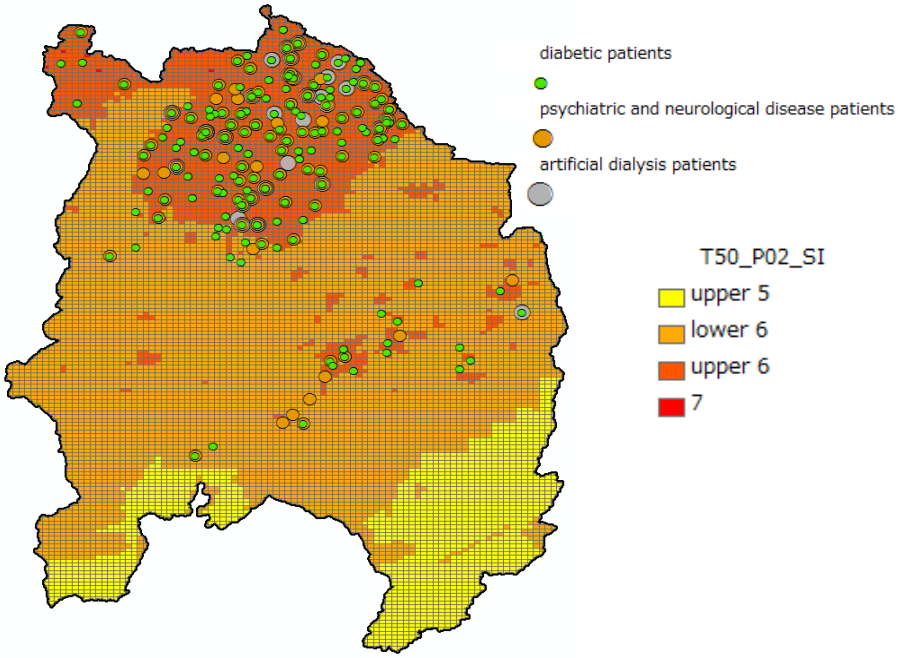

Fig. 8 – Distributions of patients and distributions under seismic intensity

Figure 8 shows that distributions of these patients and distributions of the seismic intensity (JMA-scale) of a 2% under 50-year exceedance probability. Figure 9 shows that the measurement seismic intensity (JMA-scale) distribution state to be 2% under 50-year exceedance probability of each disease. As a result of figure 8 and 9, more than 90% of these patients are living in places where seismic intensity of upper 6 (JMA-scale).

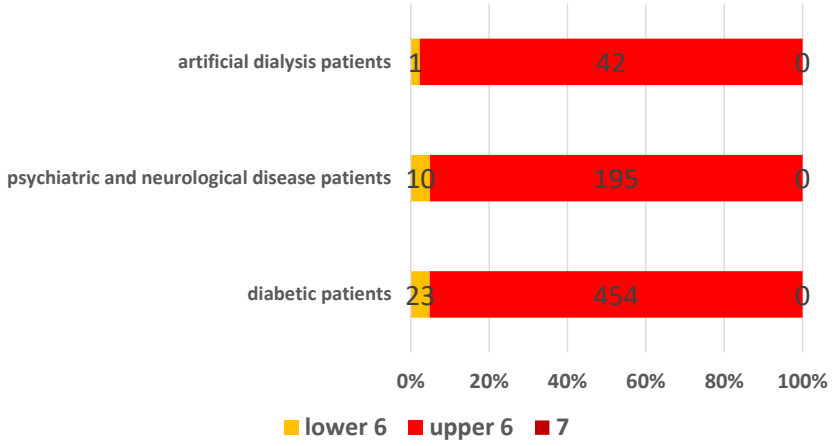

Fig. 9 – Share of major patients under seismic intensity

Figure 10 shows the distribution of major patients and the distance (km) from major medical institutions of Nanto City. Figure 10 shows the distance from major medical institutions of major patients. As a result of 10 and 11, the proportion of these patients living in 5km distance from major medical institutions is high as in the case of people in need of long-term level three or more care. It is important to determine shelters of people with special needs to disaster for each residence in order to avoid traffic congestion during the disaster.

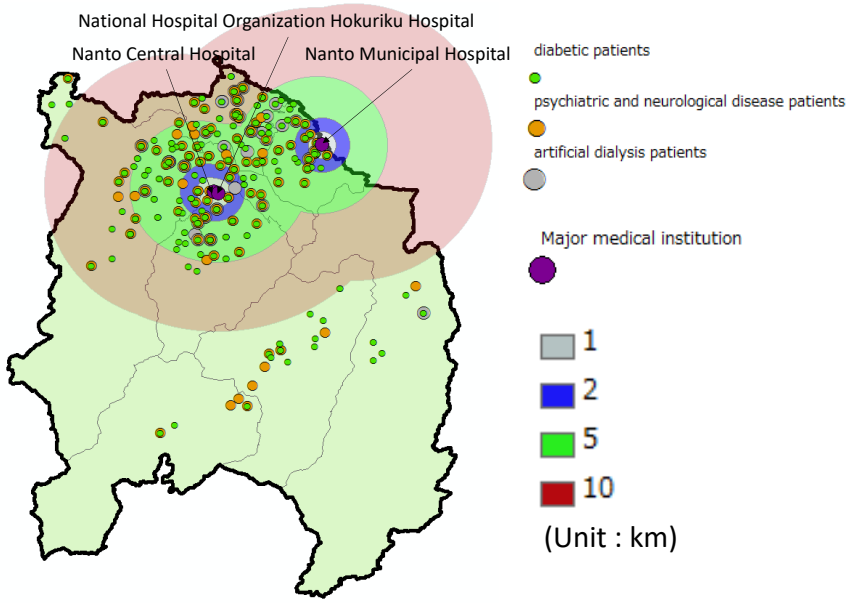

Fig. 10 – The distribution of these patients and the distance (km) from major medical institutions of Nanto City

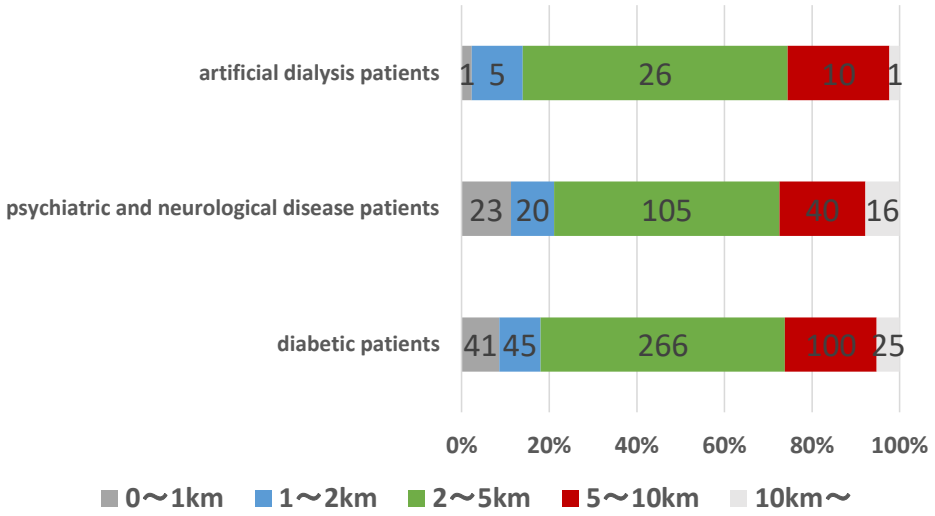

Fig. 11 – The distance from major medical institutions of major patients

5. Conclusion

By using National Health Insurance database (KDB), we visualized addresses of people in need of long-term level three or more care, diabetic patients, psychiatric and neurological disease patients, and artificial dialysis patients in Nanto City on GIS. Furthermore, by using the J-SHIS Map, we visualized the distribution of seismic intensity (JMA-scale), which is 2% in 50 years exceedance probability in Nanto City on GIS. Instrumental seismic intensity, which is 2% in 50 years exceedance probability in Nanto City are distributed from seismic intensity upper 5 to seismic intensity 7 (JMA-scale), seismic intensity is greater in the north of Nanto City. Although there is little place of seismic intensity 7 (JMA-scale) in Nanto City, most of people with special needs to disaster are living in places where seismic intensity upper 6 (JMA-scale). It was found that the proportion of those who are living in close from the main medical institutions in people with special needs to disaster is high. It is important to clarify for each residence shelters for each residence because major medical institutions are built close together in Nanto City. As future problems, we will analyse the data about other cities. Also, we will do evacuation simulation.

5. References

[1] Y. Namba, and Y. Furukawa, 2006. Present condition grasp of the disaster weak and evacuation at the time of disaster: Case study on Higashihiroshima City. *Research Reports of the School of Engineering, Kinki University No.40*, 41-46.

[2] E. Ariga, 2007. Refuge Method and Problem of the Disaster Weak. *Annual report of the Regional Studies Institute, Ibaraki University 40*, 77-85.

[3] T. Katada, Y. Oikawa, and H. Kanzawa, 1999. The Actual Circumstances and Problems of the Evacuation Activity of Frail Elderly in River Flood Disasters. *Papers on city planning 34*, 715-720.