Thank You, Akira Hayami! The Xavier Database of Historical Japan

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ABSTRACT

This article introduces the Xavier database, one of the major sources for studying historical populations in Japan. The database consists of 162 years of annual observations for 28,105 individuals living in three villages and one town of the current Fukushima prefecture between 1708 and 1870. We review the extensive efforts of the founder of Japanese historical demography, Akira Hayami, and his group in collecting, transcribing, coding, and finally making local population registers into this database for demographic analysis. We discuss the studies that flourished domestically and internationally using the data in the last two decades, followed by the discussion of current and promising development.

Keywords: Japan, Historical demography, Household registers, Longitudinal data

1 INTRODUCTION

"Thank you, Francisco Xavier!" wrote Akira Hayami (1928–2019), the founder of Japanese historical demography in 1979. Without St. Francisco de Xavier who first brought Christianity to Japan in 1549, the *Shumon-Aratame-Cho* (SAC; religious affiliation investigation registers) would never have started. SAC was the "chance by-product of the Tokugawa *Bakufu's* fear and loathing of Christianity" (Hayami, 1979) which serves as the main source for Japanese historical demography. This article introduces the source, the construction, as well as the impact of the *first* digitized data set in Japanese historical demography. The data set was named after Xavier who was one of the founders of the Society of Jesus.

The construction of individual-level longitudinal data based on household registers, SAC and similar *Ninbetsu-Aratame-Cho* (NAC) for early modern Japan has opened up arrays of possibilities for investigating the demographic behavior of commoners in the Tokugawa period (1603–1867). Japanese historical demography has come a long way since Akira Hayami's application of the method of "family reconstitution" to Japanese household registers in the late 1960s. Hayami's lifetime collection of materials on historical demography from his earlier offices including Keio University, International Research Center for Japanese Studies (Nichibunken), and Reitaku Tokyo Center, are now hosted as the "Reitaku Archives" at Reitaku University, organized and maintained by the Population and Family History Project (PFHP) headed by Satomi Kurosu.

This article first introduces the sources used for the Xavier Database and the studies of Japanese historical demography in general. Particular attention is paid to how Hayami's collection of historical records, those which he called "treasure of humankind", were transcribed and put into a format with linked annual individual/household information. Next, we discuss the process of coding and construction of the Xavier Database, the first systematic database Hayami initiated in late 1980s. While there are numerous datasets and sources available across Japan by now, the sources for northeastern communities used for the Xavier Database are known to be the most detailed. We review the Xavier data, focusing on three villages (Niita, Shimomoriya, Hidenoyama) and one town (Koriyama) in the current Fukushima prefecture. Finally, we discuss how the studies based on the dataset advanced our understanding of people's lives through the analysis of behavior and organization of individuals, married couples, and households, as well as their influence on the studies of historical demography and family history.

2 SOURCES

Two primary sources used for the Xavier Database as well as studies of historical demography in Japan are SAC and NAC.[1] Both of them are household registers and include basic information such as an individual's name, age, and relationship to the household head. A household can include not only kin members but also non-kin and servants. Notably, households can be registered even without any resident (e.g., actual residents left for work migration).

SAC was a religious investigation initiated around 1638 by the Tokugawa government as a measure to prevent the entry and spread of Christianity (Cornell & Hayami, 1986; Hayami, 1979). The quality, dates of compilation, and availability of SAC vary depending on the village and region. Some SACs are based on *de jure* information and contain excess numbers of elderly persons, who, for example, out-migrated and possibly died elsewhere but are still listed in their households of origin. NAC preceded SAC and was a type of population register in nature similar to the contents of SAC, except that NAC excludes information on religious affiliation of individual villagers (Hayami, 2001). Meanwhile, NAC tends to record detailed information on population *de facto*. However, in most cases, it is not easy nor practical to distinguish between the two because the two sources are often indistinguishable and are indiscriminately compiled resulting in the title of the documents *Shumon-Ninbetsu-Aratame-Cho*.

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1   Other sources not discussed in this article include temple death registers (*Kako-Cho*), pregnancy records (*Kainin-Kakiage-Cho*), records of population increase and decrease (*Zogen-Cho*), and *Hokonin-Uke-Jo*, a register of servants (*hokonin*) that recorded the contract detailing the type of service and length. Availability and accessibility of these sources vary greatly by region. When *Zogen-Cho* and *Hokonin-Uke-Jo* were available, they were matched with SAC/NAC to either check the content or to supply additional information for analysis.

It should be noted that unlike records of elites in other societies, both SAC and NAC documented "commoners". They include peasants, fishermen, merchants, etc., who were the majority of the population in 17th- to early 19th-century Japan. Tokugawa period was a highly stratified society. The elite bureaucrats and administrators during the Tokugawa period (*samurai* class), as well as the members of the Imperial court whose residency was segregated, were recorded separately from the commoners.[2] The documents available today are copies of the SAC/NAC, kept in the hands of village officials after submitting them to local lords. The officials kept the register copies in order to add annotations for changes of individual vital events (e.g., birth, death, marriage, service) that would occur until the next survey. These annotations provide valuable information of vital records. However, the level of details in such registers differs by local government practices. For some *han* (domains, administrative units governed by *daimyo*, territorial lords), SAC was not always done every year. For other domains, only those after certain ages were registered (e.g., after age 15 for Maeda domain, after age 8 for Kishu and Hiroshima domains). The more detailed listings include origins and destinations of migrants with reasons (e.g., marriage, adoption, service), as well as household landholdings. According to Hayami (2001, p. 25), some of the best sources, in terms of quality and length (continuing more than one century with very few years missing in-between) come from the villages in Nihonmatsu domain (in current Fukushima prefecture), and this is where the very first attempt to systematically construct a database was made.

Figure 1   *Original "Ninbetsu-Aratame-Cho": Household No.112 in Niita, year 1763*
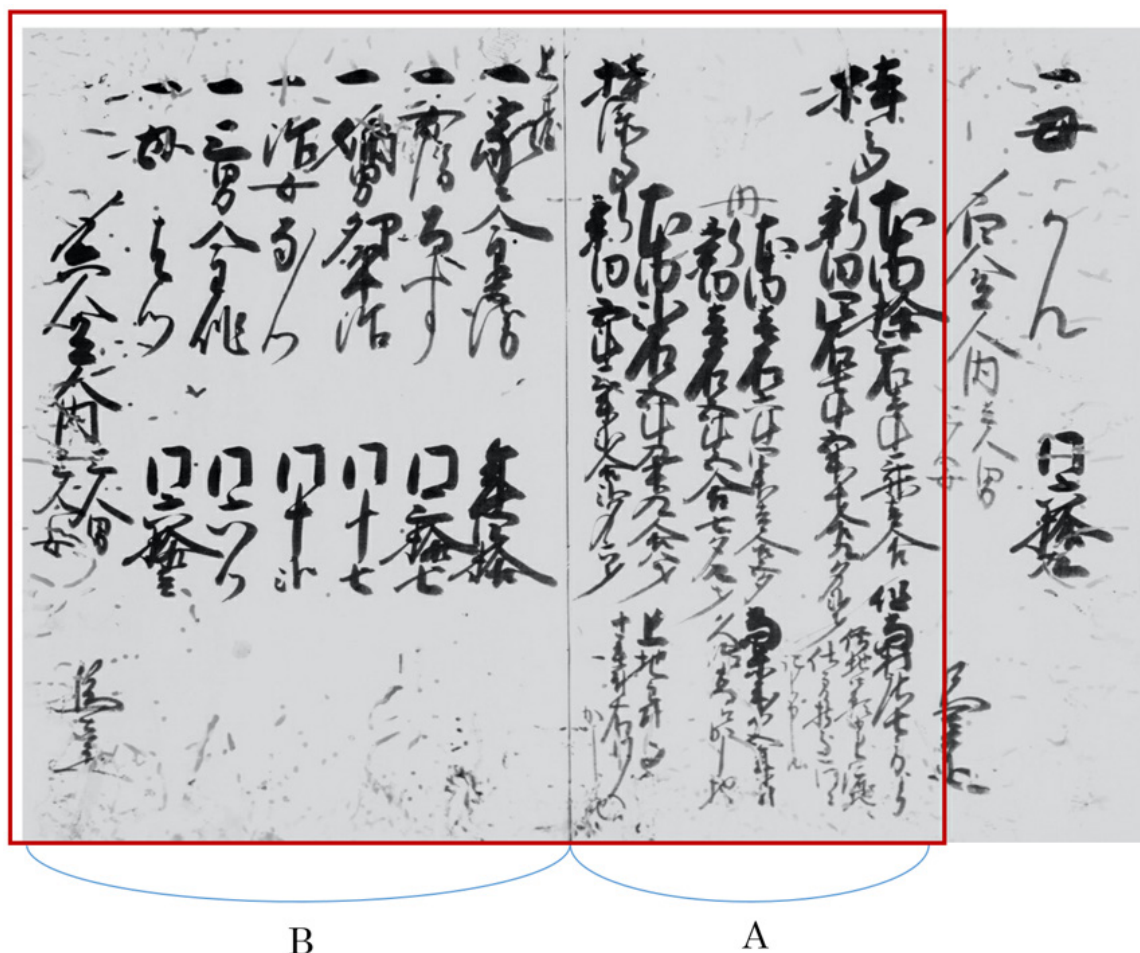
Source: Microfilm, Reitaku Archives, Population and Family History Project, Reitaku University.

Notes: NAC recorded information of all households in a village/town sequentially in one volume (book bound with Japanese paper) per year. The red square indicates one unit of household. Traditionally, the page reads from right to left. "A" lists household landholdings and lands being leased/rent. "B" lists each member of household. See text for details.

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2   For studies of *samurai* demography and family, genealogies are often used.

Figure 1 shows two pages of 1763 NAC in the village of Niita. The red square indicates one household unit. Reading from right to left, the unit starts with "A" which lists household landholding as well as lands being leased/rented, where "B" lists each household member with information about the relationship to the household head, name, and age. In this example, six household members are included: the household head (age 40), his wife (37), his first child-son (17), his second child-daughter (12), his third child-son (6), and his mother (61). The indication of the birth order of children suggests the importance of sibling hierarchy in the area. The column on the left side sums number of males and females in this household followed by number of horses.

3 COLLECTION AND TRANSCRIPTION OF REGISTERS

The collection of SAC/NAC was initiated and led by Akira Hayami in the late 1960–80s. It involved locating/finding SAC/NAC, contacting the holder, getting permission, and microfilming the materials. A great number of people of Hayami's research group have been involved in the collection of sources for over four decades. The sources for the Nihonmatsu domain in the Xavier Database were collected in local archives and private homes. The microfilms were then printed and transcribed into forms and numbers.

Since SAC/NAC registers provide annual information of household and individual life courses spanning up to 200 years, it was not easy to organize. Hayami's first trial was a manual organization of cards that tracked individual households per year (*kohyo*, not shown). Later on, he came up with the Basic Data Sheet (BDS) method of transcribing and organizing information of households for 25 years per sheet (see Figure 2). Hayami recalled that it was an "innovation" as it finally allowed researchers to track what was happening to the individuals and households "longitudinally". And, indeed, BDS was a breakthrough as a method for compiling detailed longitudinal information. It also opened up the opportunity for anyone with knowledge of contemporary Japanese to understand the content of these household registers, which otherwise would be hard to decipher without extensive training in early modern calligraphy. The annual information of a household member (name, relationship, age) is transcribed on the left panel of a BDS. Any movements or changes of status, including birth, death, marriage/adoption, and name changes, are annotated with a symbol and described at the bottom of the BDS. Any household members currently not residing in the household are placed in the right panel of the BDS with information of their locations and the reasons for not residing (for example, working as servant at other village/household). At the very right column of a BDS, the number of horses and the landholdings of the household are entered. SAC/NAC of the same household in the consecutive years are matched and transcribed following the previous year. Organized in this way, both the information of individuals and households can be tracked for the entire observation period.

The linkage of households from one year to the next was done by matching the order of appearance of the households and checking names and ages of household members. Once the BDS was written, individuals were given unique identifiers. When the linking of individual information was done manually this was done by coders; for example, matching and giving the same ID to an individual who left the household of origin and entered another household via marriage/service. Individuals were matched as long as the move took place within the village. Thus, BDS became a valuable source of longitudinal demographic information that follows intriguing life histories of commoners — like reading a biography.

Because it was before the computer revolution, most of Hayami's initial work was done manually extracting information from BDS to construct individual life courses and family. The ITS (individual tracing sheet, see Figure 3) was Hayami's invention for tracking individual movements. And, the FRF (Figure 4) follows the famous "family reconstitution form" of the French historical demographer, Louis Henry. These forms are still kept at the Reitaku Archives, although they are taken over by computer calculation and are no longer used. While Hayami has been transcribing and organizing materials that he and his group collected all over Japan, his research concentrated in the areas of Suwa (Hayami, 1973) and Nobi (Hayami, 1992) — central Japan. He rarely used BDS of the Nihonmatsu domain. Instead, Saeko Narimatsu single-handedly transcribed the original NACs to BDS. With the help of research assistants, she linked individual information from SAC/NAC to BDS and further cross-checked qualitative information of the area from local documents. Based on this laborious work, she published two books on Shimomoriya (Narimatsu, 1985) and Niita (Narimatsu, 1992), which are must-reads for later researchers studying the area.

Figure 2   *BDS (Basic Data Sheet): Household No.112 in Niita, years 1751–1775*

Source: Copy of BDS, Reitaku Archives, Population and Family History Project, Reitaku University.

Note: The blue arrow on the left refers to the household of NAC shown in Figure 1, an example of the NAC source. See text for details.

Map 1 shows the original data collection and ongoing database construction efforts spreading nationwide in Japan, as well as the area of the Xavier Database introduced in this article. The steps described above are also shown in Table 1 in relation to the figures and maps. The Xavier Database is one of the first series of Japanese historical demography datasets constructed by Akira Hayami and the members of the Eurasia Project Japan (EAP-J 1995–2000)[3] and is the most detailed and vigorously used in the last decades.[4] Details of Xavier construction are discussed in the next section.

Meanwhile, there are numerous village records entered during and after the time of EAP-J for both longitudinal (red dots in Map 1) and cross-sectional data (orange dots in Map 1) types used in historical demography and family studies. Also, there are plenty of understudied BDS (green dots in Map 1) and microfilms (blue dots in Map 1), now hosted at the PFHP. Since longitudinal data from various locations were not in the same format as the data of the Xavier Database, they were not integrated into one database during the time of EAP-J. Cross-sectional data include those with only one- or two-year SAC records. While those cross-sectional data have not been utilized for longitudinal research in Japanese historical demography, it has a potential for investigating regional variations as well as fertility dynamics (e.g., Drixler, 2013; Kurosu, 2008).

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3   Eurasia Project of Population and Family History was funded by the Japanese Ministry of Education Grant-in-Aid for Creative Basic Research (PI Akira Hayami). Official members in Japan included at least 37 scholars from various disciplines (history, sociology, anthropology, and information science). Further collections of original sources and numerous data entry, data base construction, as well as collaborative studies were pursued during this period and after. The international collaboration of Eurasia Project (EAP) continued until recently (three volumes are found here: https://mitpress.mit.edu/books/series/eurasian-population-and-family-history).

4   Another useful database is constructed by a member of the Japanese Eurasia Project, Hiroshi Kawaguchi, DANJURO (http://www.danjuro.jp/). The database includes Aizu villages in Fukushima and is publicly released (registration required).

There are numerous studies using BDS sheets of areas other than the northeastern ones included in the Xavier Database. To name a few, Hayami's own work of Suwa (1973) and Nishijo and the surrounding villages (1992) and Cornell's work on Yokouchi (1981) in central Japan; and a recent work by Nakajima utilizing a fishing village of Nomo in southwest Japan (2016).

Figure 3   *ITS (Individual Tracing Sheet): A female born in 1722 until her death in 1790, Shimomoriya*

Source: Reitaku Archives, Population and Family History Project, Reitaku University

Note: ITS traces individual moves from the start and end of observation. The form includes N=name, B=birth, M=marriage, R=adoption, E=service, and Other (V=branching out; I=change of residence, etc.) with year, age, relationship to the household head, and place/households.

Figure 4   *FRF (Family Reconstitution Form): A couple in household 112, Niita 1740–1781*

Source: *Reitaku Archives, Population and Family History Project, Reitaku University.*

Note: *The form follows an internationally used format for family reconstitution. The top part of the panel contains information about husband and wife — name, place of birth, age at marriage, month/year of birth and death. No 1–4 in this example are their children with their name, sex, birth year/month, mother's age at birth, and their information on death and marriage. Information about births is summarized for every five years after marriage in the far left of the sheet (Hayami 2001, pp. 74–79).*

Map 1   *Xavier Data and Collections of Japanese Historical Demography Sources*

Source: *Reitaku Archives, Population and Family History Project, Reitaku University.*

Note: *See Table 1 for the explanation of the colored dots.*

Table 1   *The different steps of database construction in relation to the map and figures*

Step	Work	Map/Figure
1	Making an inventory of all available sources	
2	Making a micro-film of the sources	Blue dots on Map 1
3	Making a Basic Data Sheet (BDS: systematic transcription of linked households for a maximum period of 25 years)	Green dots on Map 1, Figure 2
4	The identifiers to individuals are constructed	Figure 2 (Individual ID)
	Making an ITS for each individual	(Hayami's earlier trial) Figure 3
	Making a Family Reconstitution Form	(Hayami's earlier trial) Figure 4
5	Coding of BDS for **Xavier data**	Figure 5
6A	Computerizations of longitudinal data using BDS for villages with longitudinal records: **Xavier data:** based on coding sheets (Figure 5) Other data: based on BDS (Figure 2)	Red dots on Map 1
6B	Computerizations of cross-sectional data using BDS or other transcribed information sheets for villages with one-year records	Orange dots on Map 1

Notes: While steps 1–4 were applied to make forms from various sources that remain to digitize, steps 5 and 6A are specific to our construction of the Xavier Database, the subject of this article. Basic statistics of the Xavier Database are reported in Table 2.

As of now, Reitaku Archives include microfilmed or paper-copied documents of original SAC/NAC for about 1,870 villages/towns (Step 2). Among them, about 470 villages/towns (about 9960 village/town-years) transcribed in the format of BDS (Step 3). A meta-database of these materials has recently been made available online (limited use) to search the geographic location and type of historical records held at PFHP (Kurosu, 2020).

4   CONSTRUCTION OF THE XAVIER DATABASE

No official documentation exists as to what motivated Akira Hayami to initiate and how he pursued the construction of the Xavier Database. However, according to the detailed and yet complicated codebooks, as well as the memories of staff members who worked on the project over decades, the digitization was done with a series of trials and errors. What started in the 1980s remains an evolving process. In this section, we explain how the Xavier Database was transcribed and coded, turned into relational databases (DB2) for separate villages, and finally utilized for variable construction and analysis.

The Xavier data are based on household registers, both NAC and SAC in the northeast Japan. While this article mainly discusses four communities of Nihonmatsu domain (NACs), the Xavier Database also includes villages of the eastern-mountainous area of Fukushima[5], Aizu, and the village Yanbe in the current Yamagata prefecture (SACs). Numerous studies used the BDS (step 4 in Table 1) of Aizu and Yanbe with some researchers' own data construction efforts (e.g., Hayami & Okada, 2005; Kinoshita, 2002; Okada, 2006). Also, since the NAC of Koriyama-shimo-machi, the northern town of Koriyama, has too many missing years for longitudinal research, we only include Koriyama-kami-machi, the southern town, in this article.

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[5]   There is yet another village, Sasahara (NAC) in Nihonmatsu. As the size of the village was very small, it was conveniently used to test SQL runs but is not included in this article.

4.1 CODING AND DATA ENTRY

The first trial for the construction of a large longitudinal dataset started in the 1980s. Based on BDS, coders extracted information and organized them by handwriting into three paper forms, named A5, A6 and A7: household events and information (A5), individual age (A6), and individual events and life course (A7, see Figure 5). A5 had 10 household tables of codes and A7 had 17 individual tables of codes — including both time-constant and time-variant information as follows. For households, A5 codebook consists of the following tables: (A) entry and exit of households, (B) *de jure* or *de facto*, (C) head's information, (D) servants, (E) village official status, (F) size of household structure, (G) landholding, (H) livestock (horse, cattle), (I) ship ownership, (J) other. For individuals, A7 codebook consists of the following tables: (a) entry and exit of individuals, (b) birth, (c) death, (d) marriage (e) divorce, (f) adoption, (g) disowning (end of adoption), (h) change of residence, (i) household relationship, (j) change of name, (k) religion, (l) village official task, (m) migration, (n) other event with migration, (o) other event without migration, (p) other information (pregnant, illness, etc.), (q) other information that cannot be classified above.

Figure 5   *Xavier data format A7 for the coding of individuals*

Source: Reitaku Archives, Population and Family History Project, Reitaku University.

Note: See text for details.

The codes in each table were elaborate and complicated. The origin of the Xavier data predated easy access to computers and even preceded the Japanese word processor for data entry (Ono, 1993). It was vital to convert the information written in BDS into numbers. Therefore, it required detailed codebooks. For example, there are more than 260 codes for the relationship to the household head A7(i) distinguishing kin relations, sex, blood or marriage/adoption relationship. Only trained coders could manually, using paper and pencil, convert detailed information of BDS into thousands of sheets that consist of sheer numbers. While the codes made data entry faster, the steps involved in coding cost enormous time and manpower, as well as an increasing number of errors as more steps are required (Ono, 1993).

The forms A5, A6 and A7 were then digitized manually using a special computer program. As of today, the coding of 7 villages and 2 towns has been done[6] but the completion of the data entry was accomplished only for the four communities discussed in this article while the rest was, unfortunately, only partly completed.

4.2 THE XAVIER DATABASE AND THE EURASIA PROJECT

The database construction that started in Keio University in the early 1980s was carried over to Nichibunken (Kyoto), with Hayami's move in the late 1980s. It was at this time when the Xavier data were finally put to use. Yoshihiko Ono, associate professor at Nichibuken at the time, converted almost all the files into a relational database separating tables into time-constant and time-dependent tables using DB2 on an IBM platform. With the help of an international EAP member, George Alter, a group of EAP-J members[7] headed by Yoshihiko Ono studied SQL and database management and started the construction of variables for international comparison. It was first tested on a small village, Sasahara, and then on the two villages of the Xavier Database (Shimomoriya and Niita) which became the basis for the Japanese contribution to the international collaboration of EAP (Tsuya & Kurosu, 2004, 2010c, 2014). Constructing variables for the EAP model required laborious processing. We used DB2 SQL to write long commands to construct each variable, export them to CSV files, and import and merge them in STATA for village-based analysis. This required advanced statistical and data management skills. It also required high levels of concentration and patience, as we had to go back-and-forth to the BDS and complicated codebooks whenever an inconsistency arose. The inconsistency could be due to the SQL program, data entry errors of coders, or data entry errors of BDS transcribers. It could even be due to the original documents — mistakes of village officials in Tokugawa period. With all these laborious and time-consuming processes, we were not able to add more than two villages during the entire EAP international collaboration (Kurosu, 2016). In the late 2000s, however, we started to add another village and town from the Xavier Database to our analysis: Hidenoyama and Koriyama.

4.3 THE XAVIER DATABASE: POPULATION AND SETTINGS

Table 2 shows a summary of the database for the four communities as well as the information available in those communities. Altogether they cover the span of 162 years with a relatively small number of missing years. In addition to its long coverage, the Xavier Database provides detailed information about demographic characteristics and reason for individual "entrance" under observation (due to birth or immigration) and the month/year of death and other "exits". This is the case even for Koriyama despite the heavy in- and out-migration of the town. Socioeconomic indicators, which are not often recorded in SAC in other places, are also abundant. The two Xavier villages (Niita and Shimomoriya), in particular, are among the best quality historical population panel data available in East Asia (Dong, Campbell, Kurosu, Yang, & Lee, 2015a).

That said, we need to be careful about one problem inherent in "annual" household registers: the omission of events that happened between registers. NACs of these communities were enumerated annually at the beginning of the third lunar month[8], an important point to bear in mind for demographic calculations. The timing of marriage, for example, cannot be determined as clearly as many European

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6   This includes Shimomoriya, Niita, Hidenoyama, Sasahara, Koriyama-kami, Koriyama-shimo in Nihonmatsu which are complete, and Kuwahara, Kanaizawa, Ishibuse in Aizu, and Yanbe in Murayama. The continuation of data entry unfortunately was disrupted due to Hayami's move from Keio University to the International Research Center for Japanese Studies (Nichibunken).

7   Satomi Kurosu and Hideki Nakazato worked intensively with Ono. Noriko O. Tsuya was instrumental in defining demographic variables proposed in the EAP model for the context of Japan.

8   The timing of NAC/SAC varied by region.

parish registers. If one comes into a household with an annotation of *enduke* (marriage), the person and his/her partner married sometime between the two register years. An even more serious problem for certain demographic analysis is the omission due to infant death. Those who were born and died between the two registers may not be recorded.

Map 2 shows the location of the four communities. Shimomoriya and Niita were almost totally agricultural with an annual average population size of about 300 and 450, respectively. Hidenoyama, located about 3 km from the center of the growing market town of Koriyama, became a suburb to this town with an annual average population of about 280. Within the 160 years of observation, however, the area has gone through major famines in the 1780s and 1830s, as well as various epidemics and local disasters. The population trend in Figure 6 reflects the hardship the villages went through. In particular, the two agricultural villages, Shimomoriya and Niita, started to lose their population before the Tenmei famine in the 1780s and did not recover until the 19th century. Such constant decline is not observed in Hidenoyama. As for Koriyama, being a post town[9] with diverse economic activities, the local population increased over the years from 800 to about 2,600 inhabitants while commercial sectors developed. Koriyama was formally designated as a town (machi) in 1824 and served as the economic as well as the political center of Asaka County. While populations of neighboring villages stagnated, Koriyama experienced a stable population growth. Although it was affected by famines, the population of Koriyama soon recovered because of both in-migration and natural increase. Thus, the Xavier Database shows different population trends between Koriyama and neighboring villages, suggesting an interesting contrast of demographic dynamics between the rural and urban communities.

Table 2   *Summary and information of the Xavier Database*

Village/Town	Observation period	Years of missing registers	Person - years	Unique individuals
Niita	1720–1870	4	74,099	4,076
Shimomoriya	1716–1869	9	53,628	2,468
Hidenoyama	1708–1870	35	40,036	3,046
Koriyama	1729–1870	18	219,503	18,515
Total			**346,700**	**28,105**

Information available in four communities			
Demographic characteristics and events	Inter-personal relations	Socioeconomic indicators	Other information
Age, sex*, birth, death, marriage, divorce, adoption, service, labor-migration	Relation to the household head, conjugal, sibling, parent-child, multi-generational	Land-owner or landless peasants, village officials, household landholding, number of horses	Land rent/lease (Niita and Shimomoriya only)

*Note: *Sex is inferred based on relationship to the household head and/or name.*

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9   Post towns, *Shukuba-machi* in Japanese, were constructed along the major routes/streets in the Tokugawa period. They provided lodgings for public officials, who were forced to periodically travel between their domain and Edo with their vassals; as well as rest for travelers, who were observed more frequently as traveling became more popular throughout the country during this period. Commercial sectors also developed in these towns and catered to the needs of commoners and neighboring villagers (Kurosu, Takahashi, & Dong, 2017).

Map 2   *Present-day Fukushima prefecture — location of Niita, Shimomoriya, Hidenoyama and Koriyama*
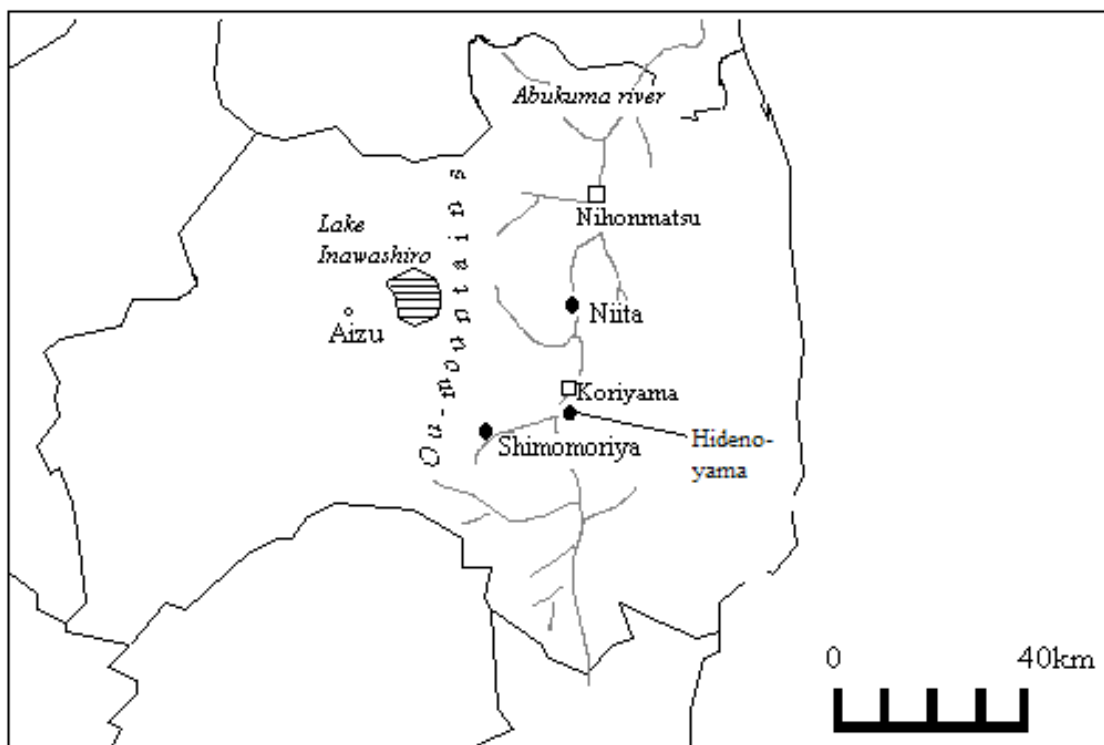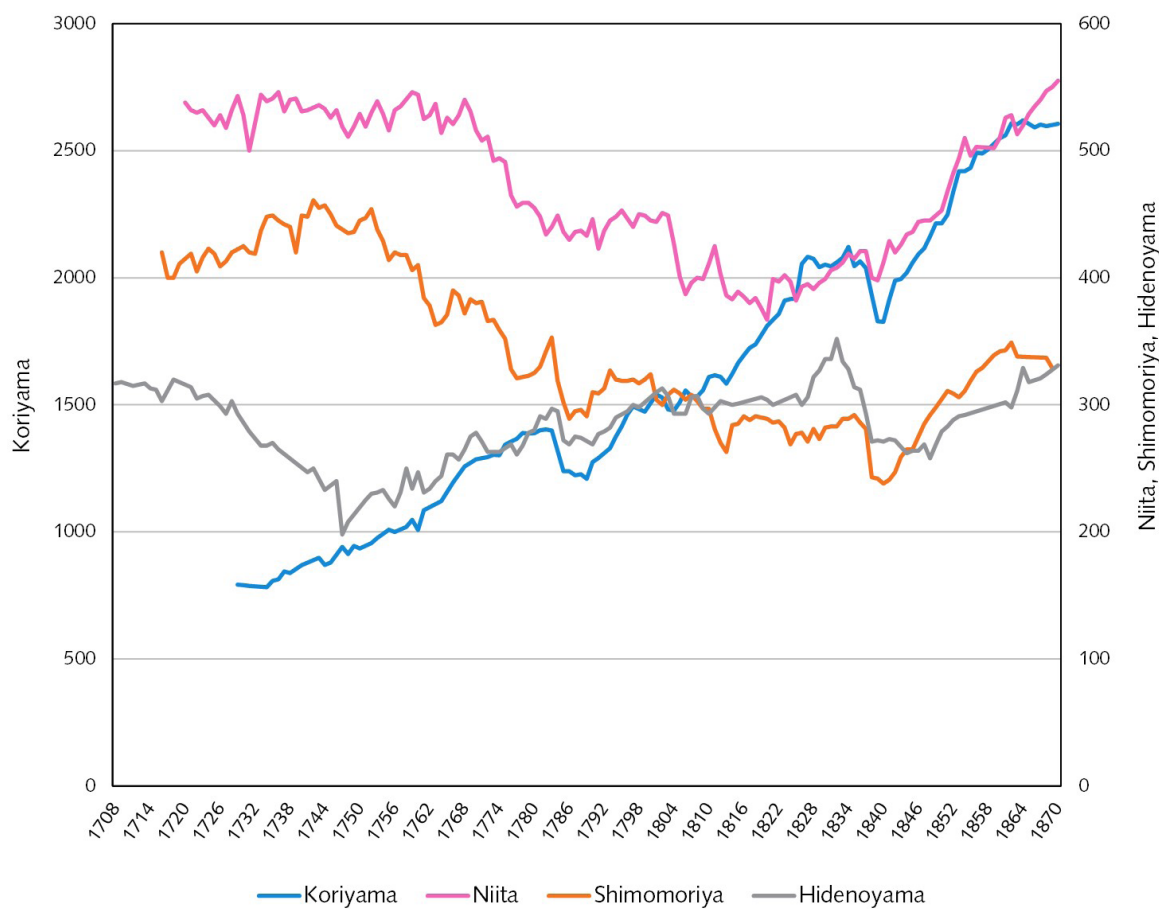

Figure 6   *Population trends of Niita, Shimomoriya, Hidenoyama, and Koriyama*

5   RESEARCH WITH THE XAVIER DATABASE

Many advances in the use of the data occurred during the Japanese Eurasia Project. Flat files for analysis based on the two villages, Niita and Shimomoriya, were first made specifically for the international comparison of mortality in EAP (Bengtsson, Campbell, Lee, et al., 2004), and successively for marriage and reproduction (Lundh, Kurosu, et al., 2014; Tsuya & Kurosu, 2010c). Japanese contributions to these volumes were based on Niita and Shimomoriya (Tsuya & Kurosu, 2004, 2010c, 2014). Modifying the models used in the international collaboration of EAP, Tsuya and Kurosu produced more detailed studies of mortality and reproduction (Tsuya & Kurosu, 2005, 2010b). These studies brought new findings about how individual demographic behaviors were influenced by socioeconomic status of households (indicated by landholdings), household context (measured by the presence of co-residing kin), and status in the household (head or closeness to household-head). Further, applying the EAP models but going beyond the topics covered by the EAP international comparison, specific topics for Japan were investigated utilizing the information available in the Xavier Database. These studies emphasized the hierarchy of gender and closeness to household-head in the stem family system; for example, the differential stress caused by the deaths of heads vs. fathers on women and children (Tsuya & Kurosu, 2002), household context and migration and survivorship (Tsuya & Kurosu, 2010a, 2013), leaving home, remarriage, divorce, and adoption (Kurosu, 2004, 2007, 2011, 2013). These studies used event history analysis and revealed how the principle of the stem family mediated individual as well as household choices.

Later on, similar models for mortality and marriage were tested with a larger sample by including the village of Hidenoyama (Tsuya & Kurosu, 2017, 2020). Further, including the town of Koriyama, we started to systematically compare patterns of marriage between village and town populations (Kurosu, Takahashi, & Dong, 2017). The EAP model was also tested with more rigorous statistical analysis to investigate the association between types of post-marital residence and reproduction (Dong & Kurosu, 2017). These studies demonstrated "northeastern characteristics" of marriage and reproduction influenced by the norm of "primogenitor" (succession by first child regardless of sex) that distinguished the area, going even beyond rural and urban differentials.

Researchers who shared knowledge and methods for working with the Xavier Database flourished in the Japanese Eurasia Project. They used various methods (both descriptive and statistical) to empirically tackle issues of family history which had been confined to institutional or household-based approaches. Comprehensive studies of Koriyama and Niita appeared in two Ph.D. dissertations using the Xavier Database and complementary local historical records (Hirai, 2008; Takahashi, 2005)[10]. Takahashi (2005) was one of the first who systematically studied a booming town, Koriyama, and indicated the importance of understanding migration as well as domanial population policy in the demographic model. The urban graveyard theory was examined but found not to be applicable for this town. Hirai (2008) studied the dataset of Niita from a comprehensive approach to individual life courses and households and found that households became more resilient and stable towards the 19th century.

Xavier data allowed a dynamic approach from individual life course perspectives providing new findings and detailed accounts for marriage, adoption, and their outcomes (Hirai, 2006a, 2015; Kurosu, 1997, 1998, 2007, 2009, 2011, 2012b; Takahashi, 2012), living arrangements (Hirai, 1998; Nakazato, 1999, 2009; Ochiai, 2001, 2006c), leaving home (Kurosu, 2004), service and labor migration (Nagata, 2001, 2004; Ochiai, 2002; Takahashi, 2019), and name changing (Nagata, 1999, 2009). These studies found how individual life courses were stratified by the rule of stem family organization, i.e., the overall aim of the continuity of households that shaped individual demographic events in order to overcome various demographic and economic constraints. The Japanese historical family was further examined in an international comparison aimed at comparing stem family societies in Europe and Japan (Fauve-Chamoux & Ochiai (Eds.), 2009). Individual-level studies of marriage, name-changing and living-arrangement based on the Xavier Database (Kurosu, 2009; Nagata, 2009; Nakazato, 2009) reveal the dynamics of individual life courses within the stem family system.

The longitudinal data of the Xavier Database also offered dynamic approaches to "old" questions about household structure, continuity, and succession. Okada applied the studies of household cycles to Nihonmatsu villages and asserted a modified version of Hammel-Laslett in order to show the clear

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10   Yet another dissertation by Okada (2006) demonstrated the developmental cycle of households in Aizu domain proposing a modified Hammel-Laslett model. She did not directly use the Xavier Database but BDS of Aizu villages from which the Xavier Database was constructed.

cyclical change of Japanese households as well as succession strategies (1998, 2000, 2002). The stem family orientation of the peasant family became clear, particularly among land-owning peasants. Hirai identified characteristics of the continuity of households spanning over a century (e.g., 2003, 2006b).

This series of studies on individual life courses and household cycles written in both English and Japanese became the core achievements of the Japanese Eurasia Project (Ochiai, 2006b) and affected the fields of historical demography and family history and sociology in various ways. First, the novelty of findings sustained by detailed and statistically sound analysis painted clear and fresh pictures of commoners' life courses and families in the 18–19th centuries. For example, universal marriage was followed by flexible divorce and remarriage. Early marriage did not necessarily bring an early start of childbearing. Fertility was extremely low because of the practice of sex-selective infanticide, and adoption compensated for demographic constraints when sons or daughters were lacking. These demographic behaviors were in accordance with peasants' strategy of keeping the stem family intact. These new findings were surprises to family sociologists influenced by the western tradition of family modernization, which emphasizes monolithic and developmental changes. They also made demographers and historians reconsider the importance of households and the stem family system in understanding the contrasting population dynamics in Japan compared with other countries (e.g., Ochiai, 2009; Saito, 1998, 2000).

Studies based on Xavier data opened possibilities for broadening research into two directions: longitudinal and regional approaches. First, within about 160 years of observation, a general improvement of climate and development of cash crops as well as sericultural industries in the region boosted development of the regional economy. Various improvements in demographic behaviors are observed, particularly related to females: increase in the female age of marriage (Kurosu, 2012a; Kurosu, Takahashi, & Dong, 2017; Tsuya & Kurosu, 2014), decline of female infant mortality (Tsuya & Kurosu, 2004), and increase of reproduction (Tsuya & Kurosu, 2010b, 2010c). Also, homogenization of age at marriage and shortening of length between marriage and divorce were associated with increasing household size and complexity making households more stable towards the end of Tokugawa period. Hirai calls the process "emergence" of Japanese traditional family that emphasizes its continuity and the stem family household (Hirai, 2003, 2006a, 2006b, 2008).

Second, the characteristics of northeastern population and family were clarified empirically in the comparative framework of regional variation in Japan (e.g., Kurosu, Tsuya, & Hamano, 1999; Ochiai (Ed.), 2006a; Okada & Kurosu, 1998; Takahashi & Kurosu, 2020). While fertility was generally low in early modern Japan, it was very low in the northeast (Takahashi, 2005; Tsuya & Kurosu, 2010b, 2010c). The survival rate tends to be lower than other studied areas of Japan (Tsuya & Kurosu, 2004). Marriage was early, universal, and more flexible than in the rest of Japan (Kurosu, Tsuya, & Hamano, 1999). Labor migration before marriage delayed marriage in central Japan, but in the northeast migration took place after marriage, making marriage a safety net for households to have them return for sure after service (Nagata, 2001, 2004). Researchers argue that the strategy was intended to increase the working-age population in households to overcome environmental hardships in the northeastern region (Hayami, 2009; Hayami & Kurosu, 2001). These arguments, however, are only based on limited village studies of the northeast, Nishijo in central, and Nomo in the southwestern Japan[11], and await further investigation.

6   CONCLUSION

This article introduced one of the major databases of Japanese historical demography, called the Xavier Database, which includes individual-level longitudinal data of populations in three villages and one town of the current Fukushima prefecture between 1708 and 1870. We discussed the long and complicated process used by the founder of Japanese historical demography, Akira Hayami, and his colleagues to collect, transcribe, code, and finally put the content of the historical population registers into a database. We also reviewed the content and studies that flourished domestically and internationally using these data in the last two decades.

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11   Databases for Nishijo (NOBI) and Nomo (NOMO) were constructed during the Japanese Eurasia Project, and also gave opportunities for developing sociological and/or statistical investigations using historical records (e.g., Nakajima, 2016; Nakazato, 2004).

During the last decade, new attempts are being made into at least four directions. First, the two villages of the Xavier Database, Niita and Shimomoriya, are harmonized and used for several comparative studies with other East Asian historical populations from northeastern China, Taiwan, and Korea — a collaborative effort sometimes referred to as the East Asia Project or EAP II (Dong et al., 2015a). The standardization and harmonization of different East Asian population datasets, an effort led by Hao Dong in collaboration with each relevant research team, have enabled detailed, systematic comparative studies about similarities and differences in population dynamics and family histories within East Asia (e.g., Dong, 2016; Dong, Campbell, Kurosu, & Lee, 2015b; Dong, Kurosu, & Lee, 2019; Dong, Manfredini, Kurosu, Yang, & Lee, 2017). Second, although still being at the experimental stage, comparative studies of early modern and post-modern Japanese families reveal some interesting resiliency or continuity of Japanese family. These studies bridge Tokugawa and contemporary Japan applying the same model for divorce and marriage to Xavier data and contemporary survey data (Kurosu & Kato, 2018; Tsuya & Kurosu, 2019). Third, there is a new effort coding and adding more information to the original Xavier Database from records of migration and land-lease. In the last few years, we identified geographic locations of 5,000 migration records from the Xavier Database. We can track where migrants came from and went to and the reasons for migration such as service, marriage, or adoption. This will add a spatial dimension to the longitudinal analysis (Kurosu, 2020; Kurosu, Takahashi, & Nagaoka, 2017; Nagaoka, Kurosu, & Takahashi, 2020). Other unique information of the Xavier Database not used until now is land lease/rent and livestock. We added more details of the land transactions (from whom, to whom) for the village of Niita. This has started to show us how land transactions were associated with social mobility and equality as well as demographic patterns of the villages (Arimoto & Kurosu, 2020). We are also constructing a database on livestock based on the records of horses and cattle in BDS. This will make additional useful information about agricultural conditions and the peasant economy related to population dynamics (Takahashi, 2018). Finally, efforts led by Satomi Kurosu with the cooperation of Hao Dong have been undertaken at PFHP to integrate various data collections and sources to advance larger-scale, longitudinal research of family behavior and population history in early modern Japan[12]. The comparative and interdisciplinary approach applied to records of thousands of lives promises new understanding of our history and the resilience of people to socioeconomic and environmental changes.

As the foundation for all, the Xavier Database still inspires us with interesting research topics and possibilities going beyond the field of historical demography and the family. We are extremely grateful for the inexhaustible research opportunities provided by the database.

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