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A rise and fall of a Chaghadaid community: demographic growth and crisis in ‘late-medieval’ Semirech’ye (Zhetysu), circa 1248–1345

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Abstract

This article analyses long-term population dynamics—growth, decline, sex- and age-composition—in Chaghadaid-era Central Asia in the context of the ‘Late-medieval Crisis’. It is based on a unique dataset of 630 epitaphs from two East Syriac (‘Nestorian’) graveyards in the Semirech’ye region (Northwest Tian Shan, North Kyrgyzstan), boosted by archaeological and osteological evidence from the same graveyards. This epigraphic corpus is truly unique in the sense that this is the only surviving data that allow the undertaking of such a quantitative reconstruction of pre-modern Central Asian demography. A close analysis of the corpus, based on the ‘excess mortality’ method, reveals rapid demographic growth between *circa* 1270 and 1330, despite frequent short-term mortality crises, caused, most likely, by a combination of environmental and political factors. The population growth came to a sudden halt because of a major plague outbreak in 1338–1339, killing about three-quarters of the local population, and initiating what was known as the Black Death of 1347–1353 in West Eurasia and North Africa. The analysis of sex and age ratios indicates that the local population regime was heavily male-dominated. The plague of 1338–1339 targeted primarily younger women, most likely due to pregnancy-related hazards; conversely, in other crisis years, adult males were more susceptible. The findings of the article are wrapped into the wider context of the ‘Late-medieval Crisis’.

Keywords: Central Asia; medieval; Chaghadaid; East Syriac Christians; population growth; plague; sex ratio; sex- and age-selectivity

Any population estimates in pre-Industrial, ‘pre-official statistics’ era are elusive and liable to methodological and interpretational criticism. Despite such a pessimistic assessment, the last 50 or so years have produced a long list of late-medieval and early modern population history studies, based on surviving quantitative data, such as taxation records, early censuses, tenants’ lists, and early parish registers from various regions in Central and Western Europe. In particular, there has been an avid interest in ‘disasters demography’—that is, structural peculiarities in morbidity, mortality, and survivorship during biological shocks, predominantly famines and pandemics, in comparison to ‘normal years’.

Roughly speaking, these works fall into three main methodological categories: (1) the ‘excess mortality method’, based on lists of deaths and incomplete/absent population structure data within a community; (2) the ‘micro-demographic method’, based on

complete population structure data within a community; and (3) the ‘palaeo-demographic method’, based on the analysis of excavated plague cemeteries. Of these three, only the ‘micro-demographic’ method is a secure way of calculating age- and sex-specific mortality rates, because it compares the structure of deaths to the structure of the population at risk of death. Such an exercise, however, can only be undertaken for the post-medieval period, when we have detailed parish registers, which allow for a secure reconstruction of the population structure. Hence, pre-modern plague studies are based either on the ‘excess mortality’ or ‘palaeo-demographic’ methods, which, in the absence of complete population structures, have obvious limitations.

The discrepancies in results and views between these studies are the product not only of different chronological and geographic contexts, but also of different methodologies deployed by plague students, depending on their subjects and disciplines. As a result, there is no consensus about sex- and age-discrimination of plague mortality. Thus, findings from late-medieval cities of northern and central Italy suggest that, with the exception of Milan, men were more prone to plague than women.¹ Conversely, during the 1629–1631 outbreak in Nonantola (northern Italy), both men and women died in, roughly speaking, equal proportions.² Similarly, more women than men died during early modern plague outbreaks in English towns.³ During recurrent late-medieval plague outbreaks in Hainault (Belgium), the pathogen tended to kill higher proportions of women than in non-crisis years.⁴

The textual-statistical analysis of sex-ratio mortality has been recently supplemented by osteological works, based on the ‘palaeo-demographic method’. Overall, a sample of about 1,700 skeletons from 22 plague burials that took place between the sixth and early eighteenth centuries reveals a disproportionate share of men (about 1.13:1.0—that is, 113 dead men for every 100 dead women). This was by no means a ‘normal’ sex ratio, with figures varying across archaeological contexts from as low as 0.68 in the sixth/seventh-century context at Aschheim (Bavaria) to as high as 1.74 in the sixth-century context at Edix Hill.⁵ It should be borne in mind, however, that such high sex ratios in ‘normal’ years are likely to reflect highly skewed archaeological samples, rather than objective demographic reality, as we shall see later.

Similarly, there is no consensus about the age-discrimination of plague mortality. Thus, during the 1452 and 1523 outbreaks in Milan and the 1630 outbreak in Nonantola, young women were at a higher risk compared not only to their brothers and husbands, but also to their older sisters and mothers.⁶ Similarly, the *pestis secunda*

¹ S. K. Cohn, *The Black Death Transformed: Disease and Culture in Early Renaissance Europe* (London, 2002), pp. 210–212. Cohn suggested that the higher mortality incidence among women in Milan was connected with poor hygiene and congestion in areas inhabited by female immigrants. Here Cohn deployed the ‘excess mortality’ method.

² G. Alfani and M. Bonetti, ‘A survival analysis of the last great European plagues: the case of Nonantola (northern Italy) in 1630’, *Population Studies* 73 (2019), pp. 101–118. The authors used the ‘micro-demographic’ method.

³ P. Slack, *The Impact of Plague in Tudor and Stuart England* (London, 1985), pp. 179–181.

⁴ D. Curtis and J. Roosen, ‘The sex-selective impact of the Black Death and recurring plagues in the southern Netherlands, 1349–1450’, *American Journal of Physical Anthropology* 164 (2017), pp. 246–259.

⁵ D. Castex and S. Kacki, ‘Demographic patterns distinctive of epidemic cemeteries in archaeological samples’, *Microbiology Spectrum* 4 (2016), PoH-0015–2015. doi:10.1128/microbiolspec.PoH-0015-2015; T. Malim and J. Hines, *The Anglo-Saxon Cemetery at Edix Hill (Barrington A), Cambridgeshire* (York, 1998); B. Bramanti, N. Zedda, N. Rinaldo and E. Gualdi-Russo, ‘A critical review of anthropological studies on skeletons from European plague pits of different epochs’, *Scientific Reports* 8, article no. 17655 (2018), doi:10.1038/s41598-018-36201-w.

⁶ G. Alfani and S. K. Cohn, ‘Nonantola 1630. Anatomia di una pestilenza e meccanismi del contagion’, *Popolazione e Storia* 2 (2007), pp. 108–109; Alfani and Bonetti, ‘Survival analysis’, p. 114.

of 1356–1366, also known as the ‘plague of children’ (*pestilencia puerorum* in Latin sources), is said to have killed a disproportionate share of younger people.⁷ This is partially reflected at St Mary Graces, London, where the combined proportion of infants and children aged 10 and below accounted for about 23 per cent of deaths, higher than the 13 per cent of fifteenth-century non-plague burials at the same cemetery. The proportion of children could, in theory, be even higher, given that child skeletons are more fragile and thus more prone to destruction than adult ones. This may also indicate that children born in the ‘inter-plague’ decade of the 1350s constituted a substantial proportion of the total population and, thus, among the plague victims—certainly higher than during the first outbreak (17 per cent of the 1349–1350 burials at East Smithfield). At the same time, however, one palaeo-demographic model has established that in the case of both the Black Death and *pestis secunda*, the risk of death in adults increased with age: that is, older adults were more likely to die than younger ones.⁸

One thing that all these studies and debates have in common is that they are focused on Europe. So far, no attempt has been made to study the question of plague mortality selectivity in a non-European context, despite the disease’s perseverance in parts of Asia and North Africa. It was only recently that historians started becoming aware of the global nature of the Second Pandemic Plague.⁹ But the lack of plague demography studies outside of Europe—with the notable exception of the Middle East, recently undertaken by Borsch and Sabraa—is not necessarily to do with a ‘European’ perspective of plague studies, but primarily with the fact that regions with the requisite demographic data are predominantly in Western and Central Europe. This is particularly true in relation to Central Asia. The rich corpus of surviving late-medieval European and, to a lesser extent Middle Eastern, sources, such as administrative records, bills of mortality, and probated wills, have no *comparanda* in either Chaghadaid Central Asia or even in nearby areas of the Yuan khanate. As a result, we remain largely ignorant of demographic trends—both in ‘crisis’ and ‘normal’ years—in late-medieval (and indeed, pre-modern) Central Asia. Because of this gap in knowledge, we do not know if trends in sex- and age-selectivity of plague mortality established from European sources reflect uniquely ‘European’ or ‘universal’ trends.

This article attempts to fill this gap by studying sex- and age-selectivity of mortality crises and wider population dynamics in later thirteenth and early fourteenth-century Semirech’ye (Zhetysu) region in Northwest Tian Shan (North Kyrgyzstan). Such an exercise is possible thanks to the survival of a unique corpus of tombstones from two East Syriac (‘Nestorian’) cemeteries in that region. The corpus covers the period of 1248–1345,¹⁰ and documents a plague outbreak that ravaged the local community in 1338–1339, as well as several more minor mortality crises.¹¹ This seems to be the earliest and the only documented and *quantifiable* instance of a fourteenth-century plague outbreak anywhere east of the Volga. But more than that, this is the only available corpus that allows a tentative reconstruction of long-term population trends in

⁷ B. M. S. Campbell, *The Great Transition. Climate, Disease and Society in the Late-medieval World* (Cambridge, 2016), pp. 313–316.

⁸ S. DeWitte and M. Kowaleski, ‘Black Death bodies’, *Fragments* 6 (2017), pp. 1–37.

⁹ M. Green, ‘Taking “pandemic” seriously: making the Black Death global’, *Medieval Globe* 1 (2014), pp. 35–41; S. Borsch and T. Sabraa, ‘Refugees of the Black Death: quantifying rural migration for plague and other environmental disasters’, *Annales de démographie historique* 134 (2017), pp. 63–93; M. Green, ‘Putting Africa on the Black Death map: narratives from genetics and history’, *Afriques* 9 (2018), pp. 1–45; P. Slavin, ‘Death by the lake: mortality crisis in early fourteenth-century Central Asia’, *Journal of Interdisciplinary History* 50 (2019), pp. 59–90.

¹⁰ Or possibly 1237–1345 (see note 22 below).

¹¹ Slavin, ‘Death by the lake’; U. Schamiloglu, ‘The end of Volga Bulgarian’, in *Varia Eurasiatrica. Festschrift für Professor András Róna Tas* (Szeged, 1991), pp. 157–163.

pre-nineteenth-century Central Asia. In reconstructing these trends, I will be deploying the ‘excess mortality’ method, based on annual counts of erected tombstones for the entire period. To appreciate this long-term population growth and decline of Semirech’ye East Syriac community, the analysis will be placed within the wider environmental, socio-economic, and political context of late thirteenth- and early-fourteenth century Mongol-controlled Central Asia, on the one hand, and within comparative contexts of similar demographic crises in West Eurasia, on the other. In particular, I will discuss the demographic trends of the East Syriac community in the context of the late-medieval (or, the ‘Long Fourteenth Century’) Crisis. As such, this study has the potential to not only shed a unique light on the demographic history of ‘late-medieval’ Central Asia (albeit via the prism of just one community), but also to contribute to our wider appreciation of mortality crises in a comparative Eurasian-wide perspective, and the awareness of the importance and impact of the fourteenth-century crisis as a Eurasian, rather than a traditionally European, phenomenon.¹²

The Semirech’ye burials database

The core material consists of a corpus of 630 tombstones, recovered from two East Syriac cemeteries in northern Kyrgyzstan, in the course of three excavation seasons in 1885, 1886, and 1892, led by Nikolai N. Pantusov (1849–1909) and his assistant A. M. Fetisov. One cemetery is situated outside of Kara-Djigach village, about 11 km to the southeast of Bishkek city centre (henceforth, the ‘Kara-Djigach cemetery’), just to the north of the Kyrgyz Ala-Too Range (formerly, the Alexandrian Range) of the Northern Tian Shan mountains; its approximate coordinates are N42°48’21.68” E74°41’8.77”. The Kara-Djigach cemetery was discovered accidentally by V. A. Andreyev, a local surveyor, in June 1885.¹³ The other cemetery is located about 1.5 km to the south of Burana, 10 km south of Tokmok (henceforth, the ‘Burana cemetery’; approximately N42°42’59.95” E75°14’34.88”) (Figure 1). The Burana cemetery was spotted and initially explored by a local resident and medicine practitioner, Dr F. V. Poyarkov, in October 1885.¹⁴ The cemeteries differed in size, with the Kara-Djigach cemetery by far the larger of the two, occupying about 32,780 square metres (about 256 x 128m); Fetisov and Pantusov estimated the cemetery to have contained about 3,000 burials. Conversely, the Burana cemetery was much smaller in size, housing no more than 100 graves.

The three seasons in which the archaeological works were conducted were: (1) October 1885 (supervised by Fetisov in Kara-Djigach and by Poyarkov in Burana); (2) August–September 1886 (supervised by Pantusov and Fetisov in Kara-Djigach and by Fetisov in Burana); and (3) September–October 1892 (both sites co-supervised by Pantusov and Fetisov). The progress of the excavations as well as the contents of each grave were meticulously recorded by Pantusov and Fetisov in their field diaries, while Poyarkov’s report was published by Nikolai M. Yadrintsev, a St Petersburg-based explorer.¹⁵

¹² Up until now, the ‘Long Fourteenth-century’ Crisis has remained confined, largely, to the domain of European history. One notable, and indeed welcome, exception is Campbell, *The Great Transition*.

¹³ *Arkhiv Instituta Istorii Material’noi Kul’tury Rossiiskoi Akademii Nauk*, Fond 1, Opis’ 1, Delo 40b (henceforth: AIIMKRAN, F. 1, O. 1, D. 40b), fol. 62r.

¹⁴ N. Yadrintsev, ‘Arkheologicheskaya izyskaniya i otkrytiya d-ra Poyarkova bliz Tokmaka’, *Zapiski Imperatorskoi Akademii Nauk* 52 (1886), pp. 152–164.

¹⁵ AIIMKRAN, F. 1, O. 1, D. 40b, fols. 2r–32r (the Kara-Djigach cemetery excavations diary) and 102r–120v (the Burana cemetery excavations diary). Pantusov described the Kara-Djigach cemetery in N. Pantusov, ‘Khristianskoe kladbishche bliz goroda Pishpeka (Semirechenskoi Oblasti) v Chuiskoi doline’, *Zapiski Vostochnago Otdeleniya Imperatorskago Russkago Arkheologicheskago Obshchestva* 1 (1886), pp. 74–83. Poyarkov’s findings are reported in Yadrintsev, ‘Arkheologicheskaya izyskaniya’. Initially, Poyarkov reported his findings (briefly)

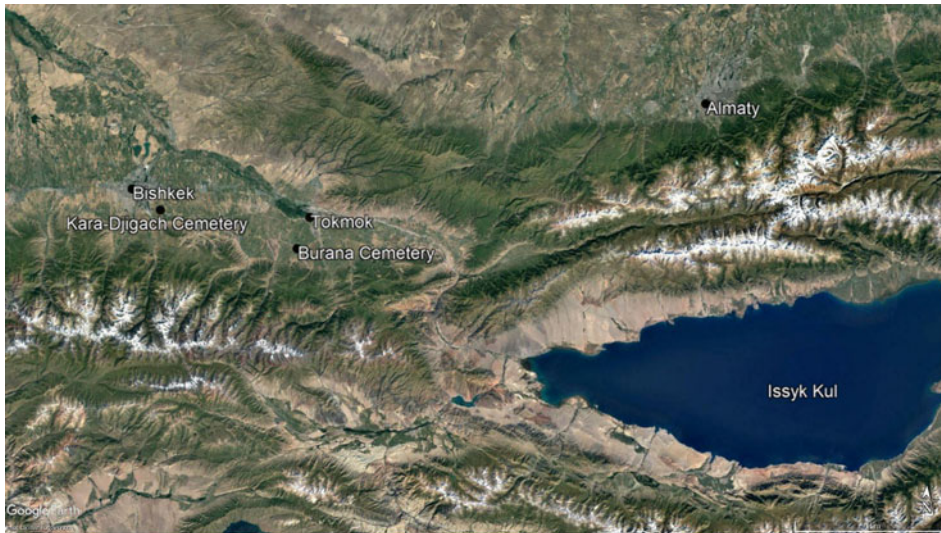


Figure 1. Locations of the Kara-Djigach and Burana East Syriac Christian cemeteries.

In the course of these 1885 and 1886 seasons, a total of 134 graves containing 144 skeletons were excavated. Of these, 85 graves with 94 skeletons were dug in Kara-Djigach (two graves with four skeletons in 1885 and the rest in 1886). Of these, 30 skulls (one in 1885 and the rest in 1886) were taken to Pantusov's headquarters in Vernyi (Almaty). The Burana excavations yielded 49 graves with 50 skeletons (primarily children and the young people) (16 in 1885 and 34 in 1886). Of these, seven skulls were taken by Poyarkov in 1885 and a further seven by Fetisov in 1886. No graves were excavated in the course of the 1892 diggings in either cemetery. In April 1888, 33 skulls (27 from Kara-Djigach and six from Burana) were sent by Pantusov to the Imperial Archaeological Commission in St Petersburg, which, in turn, transferred these to the Kunstkamera museum of the same city (also known as the Peter the Great Museum of Anthropology and Ethnography).¹⁶ As of today, only 22 skulls are kept in the Kunstkamera museum, several having been discarded or presumably lost over the course of time.¹⁷

Likewise, the three excavation seasons yielded, in total, some 581 headstones: about 57 in 1885 (35 in Kara-Djigach and 22 in Burana), about 169 in 1886 (160 in Kara-Djigach and nine in Burana), and 355 in 1892 (350 in Kara-Djigach and five in Burana). Thus, the vast majority of the headstones (545) came from Kara-Djigach, while only 36 originated in Burana. Daniil Chwolson published 553 of the accompanying 581 epitaphs in several editions between 1886 and 1897 (with corrections by Sergei Slutskii), and the remainder by

in a local weekly *Vostochnoe Obozrenie*, No. 44, 14 November 1885, pp. 3–4. The 1892 excavations report is N. Pantusov, 'Otchet o Rabotakh po Issledovaniyu Pripishpekskogo Nestorianskogo Kladbishcha v Sentyabre-Oktyabre 1892 g.', in *Arkheologiya Semirech'ya, 1857–1912 gg.*, (ed.) I. M. Samigulin (Almaty, 2011), pp. 349–351.

¹⁶ Graves 1, 3, 4, 5, 6, 7, 9, 13, 16, 20, 21, 22, 23, 24, 26, 28, 29, 32, 35, 36, 37, 43b, 46, 47, 59, 68, 75 of the Kara-Djigach Cemetery; Graves IV, X, XI, XII, XIV, XX of the Burana Cemetery. *AIIMKRAN*, F. 1, O. 1, D. 40b, fols. 84v and 118r–120r; Yu. Ludevig, *Spisok Cherepam Kraniologicheskoy Kollektzii Muzeya Antropologii i Etnografii Imeni Imperatora Petra Velikago* (St Petersburg, 1904), pp. 28–30.

¹⁷ G. F. Debets, *Paleoantropologiya SSSR* (Moscow, 1948), pp. 283–284.

Slutskii, Arthur Hjelt, François Nau, and T. W. Thacker.¹⁸ Since then, a further 60 or so stones (some illegible or without inscriptions) have been discovered, mostly by local residents; these have been published, in several series, by Chetin Dzhumagulov, Wassilios Klein, Mark Dickens, and others.¹⁹ As of today, only 200 stones are housed at several museums: about 125 in the St Petersburg Hermitage and the rest in museums in Russia (Moscow, Kazan, Omsk, and Novosibirsk), Kazakhstan (Almaty), Kyrgyzstan (Bishkek and Burana), Turkmenistan (Ashgabat), Tajikistan (Pandjakent) and Uzbekistan (Tashkent), Finland (Helsinki), France (Lyon and Paris), Germany (Munich), and the United Kingdom (Durham and London). The whereabouts of the remaining 430 or so stones are unknown.²⁰

The vast majority of the 630 tombstones are written in Syriac, a few outliers in Turkic or Syro-Turkic mixture, and one in Armenian. Of these, 467 tombstones (74 per cent of the total) are dated according to the Seleucid calendar used by local East Syriac communities, running between 1 October of the previous year to 30 September of the next year; most of the headstones also are dated, in addition, according to the 12-year animal cycle.²¹ The dated stones cover the period between the Seleucid-style years 1559 (1247–1248)²² and

¹⁸ D. Chwolson, 'Syrische Grabinschriften aus Semirjetschie', *Memoires de l'Académie Impériale des Sciences de St. Petersbourg* 34 (1886), pp. 1–30; D. Chwolson, 'Syrisch-Nestorianische Grabinschriften aus Semirjetschie', *Memoires de l'Académie Impériale des Sciences de St. Petersbourg* 37 (1890), pp. 10–168; D. Chwolson, 'Syrischnestorianische Grabinschriften aus Semirjetschie: Neu Folge (St Petersburg, 1897); S. Slutskii, 'Semirechenskiya Nestoriyanskiya Nadpisi', *Drevnosti Vostochnyya* 1 (1889), pp. 1–72; A. Hjelt, 'Drei Syrisch-Nestorianische Grab-Inschriften', *Annales Academiae Scientiarum Fennicae* S. B 1 (1909), pp. 3–11; F. Nau, 'Les pierres tombales nestoriennes du musée Guimet', *Revue de l'Orient Chrétien* (1913), pp. 3–35; T. W. Thacker, 'A Nestorian gravestone from Central Asia in the Gulbenkian Museum, Durham University', *The Durham University Journal* 59 (1967), pp. 94–107 (which has an excellent overview of the history of the Semirech'ye cemeteries' excavations and the subsequent fate of their tombstones).

¹⁹ Ch. Dzhumagulov, 'Die syrisch-türkischen (nestorianischen) Denkmäler in Kirgisien', *Mitteilungen des Instituts für Orientforschung* 14 (1968), pp. 470–480; Ch. Dzhumagulov, *Yazyk Siro-Tyurkskikh (Nestorianskikh) Pamyatnikov Kirgizii* (Frunze, 1971); Ch. Dzhumagulov, *Epigrafika Kirgizii*, Vypusk 2 (Frunze, 1982); Ch. Dzhumagulov, *Epigrafika Kirgizii*, Vypusk 3 (Frunze, 1987); Ch. Dzhumagulov, *Kyrgyzstandagy nestorian-turk zhazuu estelikteri (XIII–XIV kylymdar)* (Bishkek, 2011); W. Klein, *Das nestorianische Christentum an den Handelswegen durch Kyrgyzstan bis zum 14. Jh.* (Turnhout, 2000); M. Dickens, 'Syriac gravestones in the Tashkent Museum', in *Hidden Treasures and Intercultural Encounters: Studies on East Syriac Christianity in China and Central Asia*, (eds) D. Winkler and L. Tang (Münster, 2009), pp. 13–49; M. Dickens, 'More gravestones in Syriac script from Tashkent, Panjikent and Ashgabat', in *Winds of Jingjiao: Studies on Syriac Christianity in China and Central Asia*, (eds) Li Tang and Dietmar W. Winkler (Vienna, 2016), pp. 105–129; I. V. Fedotova, M. Dickens, D. O. Plakhuta and A. L. Avtushkova, 'Kairaki v Sobranii Sibirskikh Muzeiev', in *Trudy VI (XXII) Vserossiiskogo Arkheologicheskogo S'ezda v Samare, Tom III*, (eds) A. P. Derevianko, N. A. Makarov and O. D. Mochalov (Samara, 2020), pp. 61–63; P.-G. Borbone, 'Three notes on Syro-Turkic epigraphy', *Khristianskii Vostok* 9 (2021), pp. 105–122; M. Dickens and A. Avtushkova, 'Two Syriac gravestones in the Novosibirsk Museum', *Khristianskii Vostok* 9 (2021), pp. 123–131; P.-G. Borbone and N. Smelova, 'Paper estampages of the Syro-Turkic inscriptions from Semirech'e in the Institute of Oriental Manuscripts, Russian Academy of Sciences', *Khristianskii Vostok* (2022, forthcoming). In creating the database of the Semirech'ye burials (henceforth, the 'Semirech'ye burials database'), I have utilised these editions. Currently, Professor Pier-Giorgio Borbone of the University of Pisa is preparing a critical edition of the entire Semirech'ye corpus, which will replace the older editions. I am grateful to Professor Borbone for his numerous suggestions and clarifications regarding these inscriptions, as well as for his kind sharing of his work-in-progress.

²⁰ I am grateful to Professor Borbone for this invaluable information.

²¹ For the use of a 12-year animal cycle by East Syriac Christians of Central Asia, see Louis Bazin, *Les systemes chronologiques dans le monde Turc ancien* (Budapest, 1991), pp. 413–429. In particular, Bazin highlighted some discrepancies between the two types of chronological reckoning on some Kara-Djigach headstones. Indeed, 22 Seleucid dates, erring within the range of a year or two, have been corrected by me, to reflect their corresponding animal years.

²² Or possibly 1548 (=1236/7); the reading of the date of the earliest stone is difficult. I am grateful to Professor Borbone for his suggestion about the possibility of this date. The stone is printed in Dzhumagulov, *Kyrgyzstandagy*, pp. 73–74. For now, I have opted to stick to 1248/1249.

1656 (1344–1345); 118 of 467 (thus, one-quarter of all dated stones) are dated to 1649–1650 (1337–1338/1338–1339), the years of the plague outbreak. The remaining 166 (26 per cent) are either undated or in a poor condition with illegible dates. Of 630 tombstones, 623 (including 463 dated) indicate the gender of buried people, of which 607 show their proper names; the gender of a further 15 burials (including four dated) can be deduced on the basis of their adjectives preceding damaged names. The epitaphs also indicate, roughly, the age groups of buried individuals, through the designations *talyā/ṭlitā* (boy/girl, corresponding to under the age of 12; 54 stones in total), *ṭaymā/ṭaymtā* (young man/maiden, corresponding to the age of 12 to 20; 165 stones in total), *mḥaymnā/mḥaymantā* (believers, namely adult individuals aged over 20; 403 stones in total), and *sabā/sabtā* (old man/old woman; eight in total).²³ Because of low life expectancy, however, the overall proportion of individuals designated as *sabā/sabtā* is negligible. Also, in some instances, older people appear to be designated as ‘believers’ rather than ‘old men/women’.²⁴ Because of that, individuals designated as *sabā/sabtā* have been reckoned together with the *mḥaymnā/mḥaymantā* group. In addition, the epitaphs also indicate a clerical profession, noting priests (*qašišā, qašā*), chorepiscopi (*korappesqōpā*), ‘students’ (*eskolāyā*), churchwardens (*saorā*), as well as some other ecclesiastical positions.

Most tombstones are highly formulaic in nature, revolving around the ‘year-name-designation’ structure. A typical epitaph would consist of the following formulae: *ba-šnath* (in the year X; *hādā hay/hānu qabrāh* (this is the grave of) Y; *ṭaymā/ṭaymtā*, or *mḥaymnā/mḥaymantā*. Sometimes the age-group designation would be followed by a clerical position or, in some instances, by a supplication formula (‘Our Lord, absolve his/her sins’, ‘let him/her be liberated of his/her sins’, ‘May his/her memory be blessed, amen’). With the exception of the 1338–1339 mortality crisis, the stones do not indicate the cause of individual deaths.

The epigraphic corpus from the two East Syriac cemeteries in Semirech’ye has several important advantages. Firstly, it covers individuals from both sexes and different age groups. Secondly, it allows a robust comparison of sex ratios between (1) plague mortality (here, the outbreak of 1338–1339); (2) other ‘crisis’ years (which seem to have been caused primarily by short-term exogenous shocks, as established in Supplementary material, Appendix 1); and (3) ‘normal’ (attritional) mortality years.²⁵ Finally, the Semirech’ye corpus is the only demographic dataset from the Mongol-era Central Asia—or indeed the Mongol Empire (including Yuan China, with its highly sophisticated bureaucratic system)—that can be subjugated to a robust statistical analysis on a *micro* (that is, community-specific) level, not only in relation to plague mortality, but also in terms of long-term population trends. True, Semirech’ye tombstones are not the only example of dated epigraphic *corpora* from ‘medieval’ Central Asia. To these, we should add similar

²³ For specific age definitions of each group, see T. Audo, *Simta d-Leshana Suryaya b-Yad T’oma Audo Metropoleta d-Urmi [Treasure of the Syriac Language: A Dictionary of Classical Syriac]* (Glane/Losser, 1985), Vol. I, p. 401 and Vol. II, p. 235.

²⁴ Thus, an individual called Bačaq, buried in Grave 6, was designated as *mḥaymantā* (‘faithful woman’): Slutsii, ‘Semirechenskiya’, p. 28 (6). Nevertheless, an osteological analysis, based on cranial suture closure, revealed her to be an old woman, aged 60+. Likewise, an individual named Qutluq Tārim, buried in Grave 9, also designated as *mḥaymantā* is estimated to have been 50–60 years old at her death: Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), 50, 15 (9). See M. Spyrou et al., ‘The source of the Black Death in fourteenth-century Central Eurasia’, *Nature* 606 (2022), pp. 718–724. doi: 10.1038/s41586-022-04800-3.

²⁵ Such a comparing exercise has been already undertaken by Sharon DeWitte and her colleagues in their pioneering work on two late-medieval cemeteries in London, where they compared sex-ratio mortality during the Black Death (East Smithfield cemetery, 1348–1349), the *pestis secunda* outbreak (St Mary Graces cemetery, 1361), and attritional late-medieval burials from the latter cemetery. See DeWitte and Kowaleski, ‘Black Death bodies’. Unfortunately, the St Mary Graces cemetery burials lacked tombstones and, hence, precise chronologies of attritional burials.

late thirteenth/fourteenth-century Syro-Turkic (but primarily Turkic) East-Syriac epigraphic *corpora* of 21 stones from Almaliq (in western Uyghuristan/Xinjiang, on the modern day Kazakh–Chinese border), 28 from Inner Mongolia, and, most recently unearthed, 36 stones (as of June 2022), mostly lacking inscriptions, from Uch-Aral/Usharal (identified with medieval Ilibalyk), on the lake Alakol, about 570 km northeast of Almaty.²⁶ Also, there are nearly 200 surviving Muslim Arabic inscriptions, primarily from the thirteenth and fourteenth centuries, from different regions in Kyrgyzstan (but mostly from Osh and Uzgen, both in the Fergana Valley, Southwest Kyrgyzstan).²⁷ Obviously, these epigraphic *corpora* pale in size compared to the one at Semirech'ye; and none of the so-far excavated Uch-Aral stones is dated. It would not, in fact, be an exaggeration to say that the Semirech'ye corpus affords our only glimpse into a micro-population history of Central Asia in the pre-modern era, before the Russian Imperial Census of 1897. Although Chinese imperial censuses would record the inhabitants of Central Asian regions under imperial control (such as early eighth-century censuses of the populations of oases of Uyghuristan/Xinjiang, or Qing-dynasty censuses of Mongolian populations), they survive in a summary format, yielding regional totals, rather than local particulars. No censuses seem to have been conducted in Qing-controlled Uyghuristan/Xinjiang, and any pre-Republican figures are based on estimates of travellers or local bureaucrats.²⁸

Despite its unquestionable importance, the Semirech'ye corpus remained confined primarily to the domain of philologists, ecclesiastical historians, and, more recently, archaeologists.²⁹ For decades, its significance has been appreciated by only a handful of historians of medieval plague and environment, and only very recently has it received a full-scale treatment. Some historians see the Semirech'ye outbreak of 1338–1339 as a prelude associated with the Black Death, the single deadliest plague pandemic in recorded history, which hit West Eurasia and North Africa between 1346 and 1353.³⁰ By contrast,

²⁶ Slavin, 'Death by the lake', p. 86. The information on the Uch-Aral stones derives from the annual archaeological reports (from 2015 on), http://www.exploration-eurasia.com/inhalt_english/frameset_projekt_ac.html (accessed 19 July 2022). I am thankful for Dr Steven Gilbert, a co-director of the Uch-Aral excavations, for providing some important insights into the ongoing digs.

²⁷ K. Tabaldiyev and K. Belek, *Pamyatniki Pis'mennosti na Kamne Kyrgyzstana* (Bishkek, 2008).

²⁸ É. de la Vaissière, 'Early medieval Central Asian population estimates', *Journal of the Economic and Social History of the Orient* 60 (2017), pp. 788–817; Nicola Di Cosmo, 'Qing colonial administration in Inner Asia', *The International History Review* 20 (1998), p. 301; Ildikó Bellér-Hann, *Community Matters in Xinjiang 1880–1949. Towards a Historical Anthropology of the Uyghur* (Leiden, 2008), pp. 60–64.

²⁹ J. Stewart, *Nestorian Missionary Enterprise: The Story of a Church on Fire* (Edinburgh, 1928), pp. 198–213; V. Kol'chenko, 'Pripishpekskoye (Kara-Dzhigachskoye) Srednevekovoye Khristianskoye Kladbishche po Dannym Arkhivnykh Dokumentov o Raskopkakh 1886 Goda', in *Religii Kazakhstana i Tsentral'noy Azii na Velikom Shyolkovom Puti* (Almaty, 2017), pp. 167–179; V. Kol'chenko, 'Srednevekovoye Khristianstvo Kyrgyzstana po Dannym Arkheologicheskikh Istochnikov', in *Religii Tsentral'noy Azii i Azerbaydzhana, Tom IV: Khristianstvo* (Samarkand, 2018), pp. 48–103; V. Kol'chenko, 'Khristianskoye Kladbishche Mongol'skogo Vremeni na Gorodishche Burana (po Dannym Arkhivnykh Dokumentov o Raskopkakh 1886 Goda)', in *Genuevskaya Gazariya i Zolotaya Orda, Tom 2. Pamyati G.A. Fyodorova-Davydova*, (eds) S. G. Bocharov and A. G. Sitdikov (Kazan, 2019), pp. 209–222.

³⁰ The first person to associate the Semirech'ye stones with the Black Death was Chwolson (Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), p. 85; Chwolson, 'Syrischnestorianische Grabinschriften' (1897), p. 33). Chwolson was followed by Stewart, *Nestorian*, p. 209; G. P. Kalina, *Chuma v Sredney Azii* (Arkhangelsk, 1936), pp. 9–10; R. Pollitzer, *Plague* (Geneva, 1954), p. 14; P. Ziegler, *The Black Death* (New York, 1969), p. 25; J.-N. Biraben, *Les Hommes et la peste en France et dans les pays européens et méditerranéens*, Vol. 2 (Paris, 1975), pp. 51–52; W. H. McNeill, *Plagues and Peoples* (New York, 1976), pp. 164–165; M. W. Dols, *The Black Death in the Middle East* (Princeton, 1977), pp. 49–50; U. Schamiloglu, 'The end of Volga Bulgarian', in *Varia Eurasistica. Festschrift für Professor András Róna Tas* (Szeged, 1991), pp. 159–162; idem, 'Preliminary remarks on the role of disease in the history of the golden horde', *Central Asian Survey* 12 (1993), p. 448; J. Kelly, *The Great Mortality. An Intimate History of the Black Death, the Most Devastating Plague of All Time* (New York, 2005), pp. 7–8; and B. M. S.

some other historians see the Semirech'ye outbreak as an isolated episode, unconnected to the later Black Death.³¹ These disagreements are related to a much wider context of centuries-old historiographical controversies regarding the geographic origins of the Black Death. Here, some authors suggested that the catastrophe had originated in regions overlapping with today's borders with China (including the Qinghai-Tibet plateau and the Yunnan/Burma border); some historians suggested either 'Central Asia' generally or the Tian-Shan region more specifically; others proposed alternative regions, including North Iraq/East Anatolia, the Pontic-Caspian steppe, the Volga-Caspian region, Armenian Highlands, West Urals, Western Siberia, Mongolian-Manchurian steppe/Gobi Desert, and India.³² Recently, Monica Green proposed, on the basis of both palaeogenetic and historical data, a more complex hypothesis, whereby she placed the ultimate origins of the Black Death (the 'Big Bang'/multifurcation discussed below) in the early thirteenth-century Tian-Shan region and its proximate origins in the Caucasus-Volga region in the 1330s/early 1340s.³³

Most recently, however, genome sequencing of three individuals from plague graves at Kara-Djigach has firmly established that the outbreak in question was indeed associated with the beginning of the Black Death in particular and the Second Plague Pandemic in general. The study showed that the 'pestilence' (*mawtānā*) appearing on ten headstones from 1338–1339 was *indeed* plague; evolutionarily, the Kara-Djigach genomes are positioned *right* on a node, which gave birth to the so-called 'Big Bang'/great polytomy. The latter was a multifurcation event, whereby the main plague lineage (Branch 0) split into four new branches: Branch 1 (travelling westwards and becoming responsible for what became known in West Eurasia and North Africa as the 'Black Death' of the later 1340s and early 1350s), Branch 2 and another short branch, soon to be split into Branches 3 and 4. This means that the 1338–1339 outbreak happened around the time of the node, or shortly (no more than a few years) before the multifurcation.³⁴ Thus, this study put centuries-old debates related the geographic and chronological origins of the Black Death to rest.

This is not to say that the Semirech'ye corpus is without limitations. To begin with, the excavated, photographed, and published stones represent only about 20 per cent of all the burials there, as estimated by Pantusov in the course of the 1885–1886 fieldworks. In the course of the twentieth century, the site topography changed a great deal and the discovery and documentation of the remaining stones may not be easily forthcoming. As we have seen, no more than 60 additional stones have been discovered in the second half of twentieth century, while several Soviet archaeologists who have visited the site have commented on various difficulties in identifying the remains of the cemeteries. Thus, 630 tombstones over a period of just under 100 years is a fairly low number.³⁵

Campbell, *The Great Transition: Climate, Disease and Society in the Late-Medieval World* (Cambridge, 2016), pp. 7–8, 247, 251.

³¹ J. Norris, 'East or West? The geographic origin of the Black Death', *Bulletin of the History of Medicine* 51 (1977), pp. 11–24; M. H. Green, 'Four Black deaths', *American Historical Review* 125 (2020), pp. 1606–1607; Hannah Barker, 'Laying the corpses to rest: grain, embargoes, and Yersinia pestis in the Black Sea, 1346–48', *Speculum* 96 (2021), p. 98; Ole J. Benedictow, *The Complete History of the Black Death* (Woodbridge, 2021), p. 137.

³² For the historiography of the origins of the Black Death, see Spyrou et al., 'Source, Supplementary Information 1'.

³³ Green, 'Four Black deaths'; Nahyan Fancy and Monica H. Green, 'Plague and the fall of Baghdad (1258)', *Medical History* 65 (2021), pp. 157–177. According to Green's reasoning, the Black Death came to Europe in the later 1340s, via the Crimea, from its conjectured Caucasus/Volga reservoir.

³⁴ Spyrou et al., 'Source'.

³⁵ A. Terenozhkin, 'Arkheologicheskie Razvedki po Reke Chu v 1929 g.', *Problemy Istorii Dokaipitalisticheskikh Obshchestv* 5 (1935), pp. 148–149; P. Kozhemyako, *Rannesrednevekovye Goroda i Poseleniya Chuiskoi Doliny* (Frunze, 1959), p. 153.

Furthermore, the undated/undatable inscriptions, although adding further to our knowledge of sex-ratio and age-group distribution, cannot be contextualised chronologically. Therefore, in the current study, these 163 stones have been left out and the analysis is based on the remaining 467 stones. With the undated stones eliminated from the exercise, the remaining sample represents about 15 per cent of all estimated burials (about 3,000 in total). Moreover, this figure of 15 per cent is the absolute maximum since we do not know for sure if some local community members were buried outside these graveyards.

The paucity of epitaphs with a ‘children’ and ‘old people’ designation is related to the single biggest shortcoming of the Semirech’ye corpus—its partial representativity. Despite the remarkably large number of retrieved and documented stones, it is unlikely that they capture residents across all age, gender, and socio-economic groups in any given year. There is no evidence that local East Syriac communities operated active charitable burial societies responsible for funeral services, let alone tombstone carvings. As a result, tombstone epitaphs were undoubtedly financed either by deceased individuals leaving funds towards their future burials, or by their surviving relatives. A cursory look at the epitaphic corpus reveals that despite their formulaic nature, inscriptions tended to vary in their length and degree of detail and fineness of script and decoration. Thus, some inscriptions contained two lines of text carved in a simple script and depicting a plain cross. Some epitaphs had much longer texts executed in fine scripts around embellished crosses and sometimes additional ornamentations.³⁶ The degree of length and decoration of inscriptions undoubtedly reflects the socio-economic status of interred individual and/or their relatives. In other words, the longer and finer the inscriptions were, the more expensive they were, reflecting an economically better-off status of the individuals buried under them. Some wealthier individuals could commission fine epitaphs; less wealthy ones could command very simple inscriptions; but poor residents may not have been able to afford any at all. Indeed, of the 36 stones unearthed in Uch-Aral/Usharal (identified with medieval Ilibalyk), as of June 2022, only six have inscriptions.³⁷ As we shall see later, one conspicuous feature of the Semirech’ye corpus is a disproportionate ratio between male and female epitaphs, and between young men and young women in particular, with the former occupying a suspiciously high share of headstones compared to the latter.

In other words, only a *certain proportion* of all burials had epitaphs. While it is possible that Pantusov’s estimate of 3,000 graves and the recovery of only some 600 stones from Kara-Djigach (that is, 20 per cent of all estimated burials) may actually reflect the approximate ratio between the total burials and headstones, the true proportion was, most likely, higher than that. As Pantusov himself stated in his report, some stones were undoubtedly broken by plough-works done by local Kyrgyz farmers.³⁸ Judging from both epigraphic and photographic evidence, it appears that during the 1885, 1886, and 1892 excavation

³⁶ For instance, the epitaph of Simon (Shim’on) son of Soma, designated as a ‘student’, had a 13 lines-long text containing 26 words and a finely executed cross. See Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), 11, 3 (160); Slutskii, ‘Semirechenskiya’, p. 61 (160); Dzhumagulov, *Kyrgyzstandagy*, pp. 316–317. The stone is held at the State Hermitage Museum, St Petersburg (inventory reference number is SA 14446). Conversely, one epitaph from the Burana cemetery merely states ‘this is the grave of Yohannān the young man’, with a very crude cross. See Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), XXXI; Dzhumagulov, *Kyrgyzstandagy*, pp. 368–369. The stone is held at the State Hermitage Museum, St Petersburg (inventory reference number is SA 14442). I am grateful to Professor Pier-Giorgio Borboni for making his digital photographs of the stones available to me.

³⁷ The stones in question are ‘the 2014 meter-long stone’; IB-16-3-2; ‘the 2017 “priest” stone’; IB 17-IV-C-7; and Kayrak 1 (L-062; IB-19_C_IV_001_I002). See http://www.exploration-eurasia.com/inhalt_english/frameset_projekt_aC.html (accessed 19 July 2022).

³⁸ *AIIMKRAN*, F. 1, O. 1, D. 40b, fol. 42v.

seasons, Pantusov and his colleagues collected only whole stones, thus leaving behind the fractured ones. For comparison, the 2017 and 2019 excavations at Uch-Aral/Usharal yielded, collectively, 81 graves and 19 headstones (both whole and fractured)—a somewhat higher ratio than that between the estimated total number of graves and the total number of collected stones at Kara-Djigach.³⁹ In other words, a crude estimate that only one in four of five graves was endowed with tombstones may not actually be too far removed from the truth.

The partial representativity of the Semirech'ye corpus is reflected in the paucity of epitaphs with *ṭalyā/ṭlitā* (boy/girl) and *sabā/sabtā* (old man/old woman) designations. Most child graves are undated; in fact, 24 per cent of all *undated* graves have the *ṭalyā/ṭlitā* designation. Conversely, the proportion of the 'children' group in *dated* burials appears suspiciously low compared to the *ṭaymā/ṭaymtā* (young men/maidens) group (13 VS 116 in number). The suspiciously low proportion of 'children' in *dated* burials may reflect a deliberate practice to inter children into graves with simple and undated epitaphs.⁴⁰ In addition, this under-representation of child graves could, in part, be attributed to the practice of double and triple burials, whereby several family members would be interred together, as some local graves indeed indicate.⁴¹ Finally, it could also be down to the possibility that, at least in some instances, children may have been designated as *ṭaymā/ṭaymtā*, rather than *ṭalyā/ṭlitā*. Because of all these challenges, I have opted to join together the *ṭaymā/ṭaymtā* and *ṭalyā/ṭlitā*, designating these as 'sub-adults'. The assumption here is that most individuals within the 'sub-adult' group are teenagers and young people, rather than children, who, as noted, seem to have been under-represented in *dated* epitaphs (while undated epitaphs have been excluded from the dataset; see Table 3).

Likewise, the abysmally low number of individuals designated as *sabā/sabtā* (old man/old woman), nine in total, may be another example of under-recording and, thus, misleading. It is possible that some proportion of 'older' people were, in fact, 'mixed' in with the *mhaymnā/mhaymantā* group. On the other hand, we have to bear in mind the low life expectancy in the pre-Industrial world. Indeed, as Pantusov and his assistant Fetisov reported, out of the total of 116 graves, only three graves contained skeletons of old people, judging by the state of their jaws and teeth (Graves 41 and 77 of the Kara-Djigach cemetery and Grave V of the Burana cemetery).⁴² To avoid any false guesswork, I have joined the two groups together into a single 'adults' group.

All these caveats, however, can by no means detract from the remarkable significance of this epigraphic corpus. Its potential is enhanced further when its contents and analysis are supplemented by the excavation diaries of Pantusov and Fetisov, describing, in a meticulous format, the contents of each excavated grave, including skeletal heights and grave goods. Fortunately, during the August 1886 excavations of the Kara-Djigach cemetery, Pantusov marked each stone with a number corresponding to the grave number to which it belonged. Likewise, skulls were assigned the same number as their associated graves and headstones.⁴³ When Chwolson edited the 1890 edition of tombstones collected

³⁹ http://www.exploration-eurasia.com/inhalt_english/frameset_projekt_ac.html (accessed 19 July 2022).

⁴⁰ Indeed, out of 33 excavated graves at the Burana cemetery, ten graves were of children (Graves I, VI, VIII, IX, XV, XVII, XXIII, XXVI, XXVII and XXIX), and a further seven graves (Graves XIV, XVIII, XXI, XXIV, XXVIII, XXX, XXXI and XXXII) were of teenagers. *AIIMKRAN*, F. 1, O. 1, D. 40b, fol. 87r–120v.

⁴¹ For instance, Kara-Djigach cemetery, Graves 6, 19, 20, 28, 29, 58, 'Chapel 2, Grave C'; Burana cemetery, grave XIX (*AIIMKRAN*, F. 1, O. 1, D. 40b, fols. 6v–7r, 12r–v, 14r–v, 25v–26r, 31v–32r, 114v–116r).

⁴² *AIIMKRAN*, F. 1, O. 1, D. 40b, fols. 18v, 30v and 106r–v.

⁴³ N. Pantusov, 'Otnosheniye Starshogo Chinovnika Osobykh Poruchenii pri Voenennom Gubernatore Semirechenskoy Oblasti N. N. Pantusova v Imperatorskuyu Arkheologicheskuyu Kommissiyu o Khode Raskopok na Nestorianskom Kladbishche vblizi Pishpeka', in *Arkheologiya Semirech'ya, 1857–1912 gg.*, (ed.) Samigulin, no. 116, pp. 191–192.

in August 1886, he took care to assign two numbers to each edited inscription, with the second (bracketed) number standing for the numbers marked by Pantusov, namely corresponding to grave numbers.⁴⁴ The parallel between grave numbers, tombstones, and the identity of buried individuals can, thus, be easily established in the case of 58 out of 83 graves from the Kara-Djigach cemetery.⁴⁵ In the case of the remaining 25 excavated burials, these either lacked stones or their epitaphs were illegible. Unfortunately, establishing the same parallel for the Burana burials is not possible, because of the fact that local gravestones had been collected in the course of the October 1885 diggings, a year before 33 graves were excavated.

Semirech'ye East Syriac Christians during the Mongol (Chaghadaid) period: an ethnic and socio-economic profile

In 1218, the region that was then part of the Qara Khitai Empire came under Mongol control. The consolidation of Mongol rule was accompanied by a piecemeal conversion of the region's arable and urban landscape into pasture for conquerors' livestock.⁴⁶ Following the 1259 split of the Mongol Empire into four khanates, Semirech'ye became part of the Chaghadaid *ulus*. Despite some environmental and demographic destruction, Chaghadaid rulers—at least until their Islamisation in the late 1320s—just as their Qara-Khitai predecessors, showed a considerable religious tolerance towards local Christian, Muslim, Buddhist or Shamanist populations.⁴⁷ Of these, East Syriac Christians—regarded by the 'mainstream' Orthodox and Catholic churches as heretics primarily on account of their alleged rejection of Christ's divinity (in reality, the Church of the East maintains that Christ possesses two distinct persons, human and divine)—were not an exception.

East Syriac communities existed in Semirech'ye from at least the eighth century, as both textual and archaeological evidence indicate.⁴⁸ Despite their long history, however, very little is known about their lifestyle in both the pre-Mongol and Mongol periods. The surviving epigraphic evidence, together with archaeological reports of the 1885–1886 excavations and some occasional textual references, do shed some important light on various ethno-linguistic, socio-economic, and demographic aspects of Semirech'ye East Syriac Christians in the thirteenth and fourteenth centuries.

The East Syriac settlements, presumably situated in close proximity to the Kara-Djigach and Burana cemeteries, cannot be defined either as 'towns' or 'villages' in the 'Eurasian' sense. Those were *gorodishcha*, fortified settlements, whose inhabitants were living a sedentary lifestyle, in contrast with their nomadic neighbours, mostly Shamanists or recent converts to Islam.⁴⁹ Although, as argued below, the pre-plague population of the

⁴⁴ In the vast majority of cases, Chwolson was accurate in copying Pantusov's numbers. The only exceptions were 53,4 (22), which should have been 53,4 (2) (Kara Djigach Cemetery, Grave 2) and 48,3 (77), which should have been 48,3 (71) (Kara Djigach Cemetery, Grave 71). This discrepancy seems to have derived from the fact that in both cases, Chwolson edited the inscriptions from photographs of the stones, rather than the originals. Also, 50,18 (27) is most likely incorrect, since Pantusov did not find a stone by Grave 27 of the Kara-Djigach cemetery. Similarly, Chwolson did not include a tombstone from Kara-Djigach Cemetery, Grave 70, which has been translated in Slutskii, 'Semirechenskiya Nestoriyanskiya Nadpisi', p. 31.

⁴⁵ Kara-Djigach Cemetery, Graves 1–23, 27, 30–8, 40–1, 44–5, 48–52, 57, 59–63, 66–71, 74–75.

⁴⁶ Slavin, 'Death by the lake', pp. 68–70.

⁴⁷ Ch. Atwood, 'Validation by holiness or sovereignty: religious toleration as political theology in the Mongol world empire of the thirteenth century', *International History Review* 26.2 (2004), pp. 237–256; M. Biran, *The Empire of the Qara Khitai in Eurasian History. Between China and the Islamic World* (Cambridge, 2005), pp. 174–190.

⁴⁸ Biran, *Qara Khitai*, pp. 178–180; Kol'chenko, 'Srednevekovoye Khristianstvo', pp. 54–55.

⁴⁹ H. Yule, *The Book of Ser Marco Polo, Vol. I*. (London, 1903), pp. 284–285; V. Barthold, *Four Studies on the History of Central Asia* (Leiden, 1956).

Kara-Djigach settlement seems to have reached about 1,250 people (perhaps about 250 households),⁵⁰ it does not exhibit 'urban' features similar to some large and vibrant international trade hubs in the Semirech'ye, including Almaliq (in western Uyghuristan/Xinjiang, on the modern-day Kazakh-Chinese border), Taraz (Jambyl region, South Kazakhstan), Jand (presumably today's Zhan-Kala), and Otrar (in southwestern Kazakhstan). The same forts were 'sedentary islands' in the sea of pastoral nomadism engulfing the vast steppe of the Chaghadaid khanate.

The available epigraphic and archaeological data provide some clues about the complex ethno-cultural background of Semirech'ye East Syriac Christians. Over the entire period, about 65 per cent of all personal names were Turkic and the rest 'Syriac' (Syriacised versions of ancient Hebrew and Greek names). This ratio was by no means constant; over the period *circa* 1248–1310, it was nearly equal, while *circa* 1311–1345, Turkic names amounted to almost three-quarters of all personal names.⁵¹ This may indicate a gradual process of cultural Turkicisation. This is reflected not only in a dozen epitaphs in Turkic, but also in the fact that some Syriac epitaph phrases are, in fact, Turkic *calques*, indicating that local Christians were Turkic speakers. William de Rubruck, the Flemish missionary and diplomat to the Great Qa'an's court in Karakorum (1253–1255), noted that 'Nestorians' did not know Syriac, even though they conducted their liturgy in that language.⁵²

Although it may indicate that an ethno-linguistic Turkic element was prominent, it was certainly not the only one. As craniological analysis of 23 excavated individuals from the Kara-Djigach and Burana cemeteries, undertaken by Georgii Debets, has revealed, they exhibit Pamirid (Pamir-Fergana) features, characteristic of lowland Tajiks, belonging to the Iranic ethnic group.⁵³ Indeed, the most recent human aDNA analysis of five individuals (three from Kara-Djigach and two from Burana) revealed a close affinity to Tajik, rather than the Turkic populations of Central Asia.⁵⁴ This thin sample, however, should not be taken as indicative of the situation as a whole. In reality, epigraphic evidence suggests an ethnically diverse profile of the two communities. Furthermore, the epitaphs mentioned at least one Mongol (*Mogolayā*), one Uyghur (*Uigur*), and one Armenian (*Armnayā*).⁵⁵ Several individuals are designated as *Almāliqayā/Almāliqaytā*, namely 'of Almaliq', and one as *Kaškarayā*, that is 'of Kashgar'.⁵⁶ Almaliq and Kashgar (both in Western Uyghuristan/Xinjiang) were important international trade hubs and ethnically and religiously diverse cities, boasting sizeable East Syriac communities. Finally, two individuals were designated as 'Chinese'.⁵⁷ In other words, the ethnically diverse profile of

⁵⁰ The approximate formula of one household=5 people as a norm is invoked on the basis of eight-century Chinese censuses and Russian reports of Kyrgyz population in the mid-nineteenth century. See de la Vaissière, 'Early medieval Central Asian population estimates', and L. Meyer, *Materialy dlya geografii i statistiki Rossii. 15:10: Kirgizskaya Step' Orenburgskago Vedomstva* (St Petersburg, 1865), pp. 86–88.

⁵¹ On Central Asian Nestorian first names, see also V. Rybatzki, 'Nestorian personal names from Central Asia', *Studia Orientalia* 99 (2004), pp. 269–291.

⁵² P. Jackson (trans.), *The Mission of Friar William of Rubruck* (London, 1990), p. 163.

⁵³ Debets, *Palaeontologiya*, pp. 283–284. Other osteological works also mention artificial cranial deformation practised by the local community. See Ye. Zhirov, 'Ob Isskustvennoy Deformatsii Golovy', *Kratkie Soobshcheniya o Dokladakh i Polevykh Issledovaniyakh Instituta Istarii Material'noy Kul'tury* 8 (1940), p. 82; A. Kazarnitskiy, *Naselenie Azovo-Kaspiyskikh Stepey v Epokhu Bronzy (Antropologicheskii Ocherk)* (St Petersburg, 2012), pp. 149–150, 155–156, 160 and 258.

⁵⁴ Spyrou et al., 'Source'.

⁵⁵ Chwolson, 'Syrischnestorianische Grabinschriften' (1897), nos. 97, 100, 268.

⁵⁶ Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), nos. 3,3 (196), 3,5 (196a), 11.1 (59), 11.2 (144), 98 (52), 99 (116) and Chwolson, 'Syrischnestorianische Grabinschriften' (1897), nos. 211 and 261.

⁵⁷ Tärīm Synytā (died in 1286): Chwolson, 'Syrischnestorianische Grabinschriften' (1897), no. 24; Yohannān Tabgač the Priest (died in 1292): Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), no. 3,1 (121). I am grateful to Professor Borbone for alerting me to the latter designation.

East Syriac communities of Kara-Djigach and Burana was closely related to immigration from other parts of Semirech'ye and further regions of Central Asia. In this respect, these communities represent a microcosm of late-medieval Semirech'ye human landscape in general, characterised by the presence and mixture of Indo-European, Turkic, and Mongolic ethnic and linguistic groups.⁵⁸ This supports one recent human aDNA study of historical populations of Central Asian steppe, which revealed that up until *circa* 1600, these were characterised by high genetic heterogeneity—in contrast to more recent populations, marked by increased homogenisation, owing to strict endogamy.⁵⁹ It was indeed thanks to immigration that the East Syriac community grew considerably in size between *circa* 1250 and 1300.

Although the East Syriac communities were religiously exclusive, both epigraphic and archaeological evidence indicates that some members converted to Islam. One epitaph from 1332–1333 stated that three people buried in that grave ‘died in Islam’ (*tlathā po aošāgo Musurmān*). The 1886 excavation of the same grave revealed three sitting burials—in contrast with lying burials of other individuals.⁶⁰ The bodies showed no signs of violence, indicating a peaceful conversion. The fact that one of these graves contained multiple valuables hints that even after death the individuals continued to be fully respected members of their community. It should be pointed out that the three converts died during the brief reign of Tarmashirin Qan (1331–1334), who himself had converted from Buddhism to Islam in 1328–1329. Although Tarmashirin encouraged conversion among his subjects, there is no evidence that he ever attempted to force it.⁶¹ It is within this context that the three East Syriac Christians’ conversion to Islam is to be viewed. Despite the latter’s acceptance by their former co-religionists, these conversion cases were clear outliers: with a possible exception of one additional (undatable) tombstone, there is no evidence of any further instance of conversion to Islam.⁶²

We know very little about the occupation profile of Semirech'ye East Syriac Christians. About 30 per cent of buried males (106/365), in both dated and undated epitaphs, were designated as clerks, occupying different ecclesiastical positions. Of these, 55 were designated as ‘priests’ (*qašišā, qašā*), 32 as ‘students’ (*eskolāyā*), and a further 19 occupied various other clerical roles, including churchwardens, chorepiscopi, and teachers. The disproportionate share of East Syriac men being ordained as priests has been noted by several thirteenth-century Western authors, including Rubruck, who visited the region in 1253, and stated that this practice was related to the fact that bishops had barely visited these parts once in 50 years.⁶³ Interestingly, many *eskolāyā* were, in fact, boys, as their skeletal evidence shows.⁶⁴ Again, this resonates with Rubruck’s statement that even male children still in the cradle were ordained as priests.⁶⁵ A high proportion of ordained

⁵⁸ T. K. Khodzhayov, *Etnicheskie Protsessy v Sredney Azii v Epokhu Srednevekov'ya* (Tashkent, 1987), pp. 29–30.

⁵⁹ G. A. Gnechi-Ruscone et al., ‘Ancient genomic time transect from the Central Asian Steppe unravels the history of the Scythians’, *Science Advances* 7 (2021), eabe4414.

⁶⁰ Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), no. 44; *AIIMKRAN*, F. 1, O. 1, D. 40b, fols. 19r–22r.

⁶¹ M. Biran, ‘The Chaghadaids and Islam: the conversion of Tarmashirin Khan (1331–34)’, *Journal of the American Oriental Society* 122 (2002), pp. 747–748.

⁶² Chwolson, ‘Syrisch-nestorianische Grabinschriften’ (1897), no. 240.

⁶³ Jackson (trans.), *Mission of Friar William*, p. 163.

⁶⁴ Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), nos. 50,6 (34) and 50,12 (38); Kara-Djigach Cemetery, Graves 34 and 38 (*AIIMKRAN*, F. 1, O. 1, D. 40b, fols. 15v–17r). There are some exceptions to this, however: one individual named Sargis (Serge), designated as *eskolāyā*, interred in Grave 22 (Chwolson, ‘Syrisch-Nestorianische Grabinschriften’ (1890), no. 50,22 (21)), has been classified, on the basis of cranial suture closure, as 40–50 years old. See Spyrou et al., ‘Source, Supplementary Information 2’.

⁶⁵ Jackson (trans.), *Mission of Friar William*, p. 163.

priests does not mean that the same East Syriac men designated as *qašišā/qašā* or *eskolāyā* were, in fact, involved in church roles.

Some locals were undoubtedly involved in international trade along the long-distance trans-Asian trade routes (often erroneously called the ‘Silk Road’). In particular, the Kara-Djigach and Burana forts, alongside other East Syriac settlements in Semirech’ye, including Krasnaya Rechka, Ucharal (Ush-Aral, identified with Ilibalyk), and Novopokrovka, were situated at the heart of this trade network—halfway between the two linked trade emporia of Otrar and Almalīq—and, as such, they may have served as intermediate stops of rest and trade for passing merchants.⁶⁶ Rubruck referred to East Syriac Christians as ‘usurers’, presumably implying their financing activities. Marco Polo, in his *Travels*, too, referred to them as ‘capital merchants’.⁶⁷

The 1885–1886 excavations unearthed some grave goods that reveal Semirech’ye Christians’ involvement in long-distance trade. These include pearls (originating in the Persian Gulf, Indian and Pacific oceans), and corals and *Marginella* shells (presumably from the Mediterranean Sea).⁶⁸ In addition, some graves contained precious metals, stone beads, golden brocade cloths, and fine silk textiles.⁶⁹ It is unclear if silk clothes were acquired from elsewhere or produced locally: as Marco Polo pointed out, some East Syriac Öngüts of Inner Mongolia were also skilled textile artisans.⁷⁰ Those buried goods closely resemble artefacts most recently unearthed in another late thirteenth/early fourteenth-century East Syriac cemetery at Ilibalyk (Ush-Aral).⁷¹

Numismatic evidence from Kara-Djigach sheds some additional light on the financial and commercial activities of the local community. This consists of two Chaghadaid-era hoards found near the Kara-Djigach cemetery, published, respectively, in 2002 and 2016, and containing 139 (129 *dinars* and 10 *dirhams*) and 26 coins each (20 *dirhams* and six *dinars*). Taken together, the hoards included 55 coins from the mint of Bukhara, 47 from Termez (South Uzbekistan, on the Uzbek-Afghan border), 31 from Samarqand, 16 from Otrar, three from Badakhshan (North-East Afghanistan), two each from Shash (Tashkent) and Almalīq, and one each from Taraz (formerly Dzhambul, South Kazakhstan, on the Kazakh-Kyrgyz border) and Soltaniyeh (the Ilkhanid capital in North Iran).⁷² The minting provenance of these coins indicates that long-distance trade stretched to Khwarazm, Transoxiana, and as far as Balkh, Badakhshan, and North Iran (with Soltaniyeh situated some 3,000 km southwest of Kara-Djigach). The circulation of coinage from these mints in the Semirech’ye region is reflected also in other hoards from the Chu and Talas valleys.⁷³ Most recently, it has been argued that Kara-Djigach

⁶⁶ Slavin, ‘Death by the lake’, pp. 76–78.

⁶⁷ Yule, *Ser Marco Polo*, pp. 284–285.

⁶⁸ AIIMKRAN, F. 1, O. 1, D. 40b, fols. 8r–9v, 10v, 11v, 13v–14r, 15r, 16r, 26v, 117r, 118v–119r (Kara-Djigach Cemetery, Graves 9, 15, 26, 31, 35, 36, 61 and Burana Cemetery, Grave XXI (pearls); Kara-Djigach Cemetery, Grave 18 (shells); Kara-Djigach Cemetery, Grave 12 and Burana Cemetery, Grave XXX (corals)). For the pearl trade in the Mongol Empire, see T. T. Allsen, *The Steppe and the Sea. Pearls in the Mongol Empire* (Philadelphia, 2019).

⁶⁹ AIIMKRAN, F. 1, O. 1, D. 40b, fols. 21r–22r, 30r–v, 114r–116v, 119r–v (Kara-Djigach Cemetery, Grave 77 (silk); Kara-Djigach Cemetery, Grave 43c and Burana Cemetery, Graves XIX and XXXI (brocade, silver and gold); Kara-Djigach Cemetery, Graves 8, 12, 17–18, 36, 38, 76 and Burana Cemetery, Graves XXV, XXX–XXXII (beads)).

⁷⁰ Yule, *Ser Marco Polo*, pp. 284–285.

⁷¹ http://www.exploration-eurasia.com/inhalt/projekt_ac.htm#2017 (Appendix E) (accessed 19 July 2022).

⁷² M. Fedorov, ‘A hoard of fourteenth century Chaghatayid silver coins from North Kirghizstan’, *The Numismatic Chronicle* 162 (2002), pp. 404–419; Ye. S. Ochkasov, ‘Komplekt monet Chagataidov XIII–XIV vv. iz Chuiskoi doliny’, *Numizmatika Zolotoi Ordyy* 6 (2016), pp. 109–112.

⁷³ M. Ye. Masson, ‘Istoricheskii etyud po numizmatike Dzhagataidov (po povodu Talasskogo klada monet XIV v.)’, *Trudy Sredneaziatskogo Gosudarstvennogo Universiteta. Arkheologiya Srednei Azii* 4 (1957), pp. 41–108; P. N. Petrov and A. M. Kamyshv, ‘Nakhodka Chagataiskikh monet na territorii Chuiskoi doliny’, in *Trudy Mezhdunarodnykh*

may have had its own mint, striking low-quality imitation coins, whose circulation was limited to the Chu Valley.⁷⁴

Although financial and commercial activities might well have involved many Semirech'ye East Syriac Christians, it is possible that at least some of them were engaged in farming. In describing the East Syriac Öngüts of Inner Mongolia, Marco Polo noted that they practised both arable and livestock economies.⁷⁵ The cultivation of millet is indeed noted by both Giovanni da Pian del Carpine (1246) and Rubruck.⁷⁶

Semirech'ye East Syriac Christians during the Mongol (Chaghadaid) period: demographic growth and decline

The continuous nature of the Semirech'ye tombstone chronology from the Kara-Djigach graveyard allows us to follow the main demographic of the local community—in particular, its long-term growth and annual mortality levels. If the earliest tombstone from Kara-Djigach is dated to 1248, this may imply that the community may have been founded there in the early thirteenth century, following the Mongol conquest in 1218, but most likely in the aftermath of the widespread environmental and demographic destruction inflicted by their forces in the 1220s and 1230s. If we are to assume that the community was founded closer to the date of the earliest tombstone (1248), then we may postulate that a non-negligible proportion of individuals buried in the course of the first three or four decades following the settlement foundation were immigrants.⁷⁷ As we have seen, some of these immigrants undoubtedly came from Almaliq, as it is indicated in two epitaphs from the 1280s bearing the toponymic designation *Almāligayā/Almāligaytā*.⁷⁸ Moreover, five out of the total of nine individuals designated as 'old people' (*sabā/sabtā*) in the Semirech'ye corpus died between 1252 and 1286. This fact implies that these five individuals were born before the foundation of the Kara-Djigach settlement and came there as immigrants. Although very few epitaphs hint at the geographic origins of migrants (of the total 630 inscriptions, both dated and undated, only seven mention a specific location, in all cases Almaliq and Kashgar), we may speculate that most of these came from other East Syriac settlements in Semirech'ye and the Tarim basin. Apart from Almaliq (and indeed Kashgar), this region was a home to numerous vibrant East Christian communities, situated in or next to Burana, Krasnaya Rechka, Ush-Aral (identified with Ilibalyk), Novopokrovka, Kok-Djar, Saruu, Tash-Rabat, Ivanovka, and Zhuuku (on the southern shore of Lake Issyk-Kul').⁷⁹ It is unclear whether these immigrants were drawn by 'push' or 'pull' factors. On the one hand, numerous contemporary authors and travellers report the destruction and decay of Semirech'ye towns in the aftermath of the Mongol Conquest in 1218. Hence, it is possible that these individuals were, in fact, refugees. On the other hands, some cities—Almaliq first and foremost—were spared

Numizmaticheskikh Konferentsii. *Monety i Denezhnoe Obrashchenie v Mongol'skikh Gosudarstvakh XIII–XV vekov*, (ed.) P. N. Petrov (Moscow, 2005), pp. 88–90.

⁷⁴ P. N. Petrov and A. M. Kamyshov, 'Novyi Chagataidskii monetnyi dvor XIII–XIV vv. (k numizmatike gorodishcha Kara-Dzhigach)', in *Margulanovskie Chteniya—2020: Materialy Mezhdunarodnoi Nauchno-Prakticheskoi Konferentsii 'Velikaya Step' v Svete Arkheologicheskikh i Mezhdistsiplinarnykh Issledovaniy (g. Almaty, 17–18 Sentyabrya 2020g.)*, (ed.) B. A. Baitanayev (Almaty, 2020), Vol. 1, pp. 266–285.

⁷⁵ Jackson (trans.), *Mission of Friar William*, p. 163; Yule, *Ser Marco Polo*, pp. 284–285.

⁷⁶ C. Dawson (trans.), *Mission to Asia* (New York, 1966), pp. 17, 56–57, 96, 100.

⁷⁷ If, however, the correct date of that stone is 1237, rather than 1248, then the community may have been established in the 1230s, if not the 1220s.

⁷⁸ A certain priest called Gyorgis (George) (d. 1287) and a woman called Tabita (d. 1288). See Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), nos. 98 (52) and 99 (116).

⁷⁹ Klein, *Das nestorianische Christentum*, pp. 101–125; Kol'chenko, 'Srednevekovoye Khristianstvo'.

by the Mongols and continued prospering, in the course of the thirteenth century.⁸⁰ Hence, some Almalıq (and Kashgar) residents may have been attracted by commercial opportunities arising along the long-distance trans-Asian trade routes and migrated to Kara-Djigach, which was conveniently situated at the heart of the northern branch of these routes.

There can be little doubt that immigration played a paramount role in the demographic growth of the Kara-Djigach community during the first decades of its history. Initially, growth was slow. As Figure 1 and Table 1 indicate, before the 1280s, there is one surviving tombstone per year, reflecting the small size of the community—even if we assume that these cover only 15 per cent of the total population. The crisis of 1264, discussed below (and in a further detail in the Supplementary material, Appendix 1), undoubtedly contributed to the temporary slowdown of demographic growth. The recovery, however, came shortly afterwards: as we can see, the decadal average of annual surviving tombstones rose considerably in the course of the following decades—from one in the 1270s to five in the 1300s.

Population growth continued in the following decades, right until the sudden and devastating outbreak of plague in the summer of 1338. The fivefold increase over just 30 years implied an annual population growth of 5.5 per cent, a remarkably high figure compared to Western Europe in the same period.⁸¹ Such a fast growth would have been impossible without high fertility and intense immigration. As we have seen above, there is sufficient evidence about immigration into Semirech'ye communities.

As Table 2 indicates, in pre-plague years, the proportion of sub-adult (children and young people) epitaphs accounted for about three-quarters of all headstones. Although the fact that some children were interred with their parents and lacked their own epitaphs conceals the true proportion of child burials, there is no doubt that the preponderance of adult gravestones reflects the fact that most people died as adults and that sub-adult mortality was less common, as far as non-plague years are concerned. Child survival and adolescence were a crucial factor in ensuring high fertility rates, which were, as we shall see later, connected to the very low age of women's first marriage, standing between *circa* 12 and 15.

In particular, high fertility and immigration would be essential in sustaining demographic growth in the face of intermittent mortality crises. Mortality crises are understood here as high spikes in numbers of tombstone counts (serving as proxy for annual burial levels), compared with 'average' tombstone counts in adjacent years (Figure 2). The single most pronounced spike can be seen under the years 1338 and 1339 and is related to the plague outbreak in the summer of 1338 (118 tombstones out of the total 467 dated stones are dated to these two years). Although this remarkable spike undoubtedly reflects a harsh mortality crisis, only ten out of 118 tombstones, for 11 individuals, record 'pestilence/plague' (*mawtānā*). These inscriptions contained the formula 'X died of pestilence' (*mīt[ā] [bi-]mawtānā*).⁸² Obviously, this can by no means mean that only these 11 individuals perished in plague, while the remaining 108 or so individuals were miraculously spared the pathogen and died of something else. Plague is a highly contagious disease with remarkably high and fast transmission rates. Given the closed and, as we shall

⁸⁰ M. Biran, 'Rulers and city life in Mongol Central Asia (1220–1370)', in *Turko-Mongol Rulers, Cities and City Life*, (ed.) David Durand-Guedy (Leiden, 2013), pp. 257–283.

⁸¹ In pre-Black Death England, annual population growth appears to have been in the area of 0.5 per cent. S. Broadberry, B. Campbell, A. Klein, M. Overton and B. Van Leeuwen, *British Economic Growth, 1270–1870* (Cambridge, 2015), p. 12.

⁸² Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), nos. 49 (100), 49.11 (222), 50.16 (30) (=Kara-Djigach Cemetery, Grave 30, AIIMKRAN, F. 1, O. 1, D. 40b, fols. 14v–15r); Slutskii, 'Semirechenskiya Nestoriyanskiya Nadpisi', p. 4; Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1897), nos. 139–42, 167, 183.

Table 1. Decadal averages of annual surviving tombstones in the Kara-Djigach and Burana cemeteries, *circa* 1251–1335.

	Surviving stones per year	Hypothetical total burials per year
1250s	0.4	3
1260s	2.2	15
1270s	1.0	7
1280s	3.7	25
1290s	3.1	21
1300s	5.3	36
1310s	4.2	28
1320s	4.9	33
1331–1335	5.2	35

Source: Semirech'ye burials database.

Table 2. Age-group distribution of Kara-Djigach and Burana epitaphs, 1248–1345.

	All tombstones	Children	Young people	Adults	Old people	Adults and old as %
1248–1270	31	1	6	22	2	77%
1271–1300	80	1	24	50	4	68%
1301–1337	197	5	38	151	3	78%
1338–1339 (plague years)	118	6	38	72	0	62%
1340–1345	41	2	17	21	0	53%
All non-plague years	349	9	85	244	9	73%
All pre-plague years	308	7	68	223	9	76%
Normal (non-crisis) years	161	5	36	113	6	74%
Crisis years, except 1338– 1339	188	4	49	131	3	72%
All years	467	15	123	316	9	70%

Source: Semirech'ye burials database.

see below, dense nature of local settlements in the Semirech'ye region, it is to be expected that a plague outbreak would result in high mortality—as was indeed the case here. If anything, this paucity of epitaphic references to plague has to do with the fact that not every deceased individual could afford the luxury of having these carved on their graves. As we have seen above, in the absence of a perpetual and active charitable burial society,

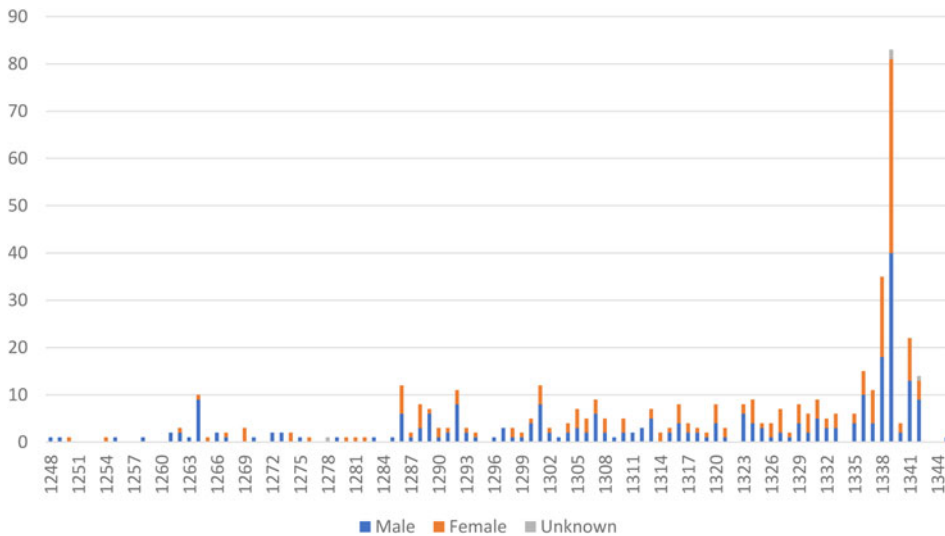


Figure 2. Annual tombstone counts of the Kara-Djigach and Burana cemeteries, 1248–1345. Source: Spyrou et al., 'Source'; Semirech'ye burials database.

tombstones were undoubtedly financed either by deceased individuals leaving funds towards their future burials or by their surviving relatives. Again, we can assume that the longer the inscriptions, the more expensive they were. Hence, their length may be correlated with the wealth of buried individuals, and/or their relatives.

Although it is undoubtedly the single most devastating disaster, we also have to account for more minor mortality crises, as reflected in 'lower' spikes in the numbers of annual tombstones—in 1264, 1286, 1288–1289, 1292, 1301, 1307, 1316, 1320, 1323–1324, 1327, 1329, 1331, 1336–1337, and 1341–1342 (Figure 2). As discussed in the Supplementary material, Appendix 1, most of these excess mortality spikes may have been caused by subsistence crises triggered by a combination of exogenous and endogenous factors. While these non-plague mortality crises undoubtedly hindered the intense population growth of Semirech'ye East Syriac communities, the plague outbreak, as we shall see, led to them vanishing almost immediately.

One way to estimate the total population of the East Syriac community on the eve of the plague outbreak is to add together the annual numbers of surviving tombstones between 1335 and 1345 (the last dated tombstone), assuming that most, if not all, of the survivors of the plague (who died between 1340 and 1345) resided there on the eve of the plague outbreak. This renders a total of 191 tombstones, which, if deflated by 0.15 (as deployed in Table 1, to account for missing burials), hints that the population size *circa* 1335 may have been around 1,270 people. Deflating the hypothetical figure of 35 annual burials (five annual tombstones deflated by 0.15 to account for missing burials) by 1,270 yields the annual death rates of 2.8 per cent (or 28 per 1,000)—largely comparable with 2.5–3.0 per cent in Western Europe around the same time.⁸³

No immigration, however, could save the Semirech'ye communities from a devastating plague outbreak, which arrived in, most likely, the summer of 1338 and ravaged the

⁸³ M. Kowaleski, 'Gendering demographic change in the Middle Ages', in *The Oxford Handbook of Women and Gender in Medieval Europe*, (eds) J. Bennett and R. Karras (Oxford, 2013), pp. 182–183.

population into the next year.⁸⁴ A crude estimate suggests that the outbreak may have killed about 75 per cent of the local population. This estimate derives from the fact that there are 118 tombstones for the plague years and 41 tombstones related to the plague survivors, all of whom died between 1340 and 1345, at which point the Semirech'ye communities ceased to exist. In other words, of 159 individuals, 118 died in the plague. This is, obviously, just a fraction of the total number of burials; as indicated below, only a certain percentage of graves—perhaps 20–25 per cent—were endowed with headstones. Therefore, it is unclear how reliable this sample of 159 excavated stones is, when estimating the mortality rates during the plague outbreak. In any event, if this estimate is not too far from reality, then it appears that the plague was more devastating in Semirech'ye than it was in Western Europe and the Middle East a decade later, where mortality rates stood, in various regions, in the region of 50–60 per cent.⁸⁵

Explaining such exceptionally high mortality rates, even in comparison to the Black Death in Europe and the Middle East, is hardly possible at this stage. Although it may have something to do with the population densities of Semirech'ye sedentary fortified settlements (*gorodishcha*), which were undoubtedly much thicker than those of nomadic pastoralist communities, they were undoubtedly not nearly as thick as European and Middle Eastern cities. As some Soviet archaeological surveys reported, an average *gorodishche* in Chui Valley had fortified walls measuring about 500 x 500 metres (=25 hectares).⁸⁶ If the East Syriac settlement related to the Kara-Djigach cemetery was about the same size, and if its pre-plague population peaked at about 1,250 people (see above), then its population density may have stood at about 50 people per hectare, in contrast with the average of 200–250 people in West European cities *circa* 1300.⁸⁷ Another possibility—now that it has been established that the 1338–1339 outbreak was indeed associated with the 'Black Death' in Europe, North Africa, and the Middle East—is that the plague was particularly virulent at the beginning of its westward journey from Central Asia. Recent palaeogenetic research has established the phenomenon of virulence-related genes attenuation (reduction and loss) in historical *Yersinia pestis* bacteria.⁸⁸ Such processes, however, happen over centuries or at least several decades, rather than a few years. As one recent study of the so-called First Plague Pandemic (also known as the early-medieval or Justinianic plague) has found, it took at least 80 years for the plague lineage (O.ANT4) to lose some of its virulence genes, after the plague appeared in Egypt in 541.⁸⁹ When the plague was ravaging West Eurasia and North Africa between 1346 and 1353, it was certainly highly virulent,

⁸⁴ This is based on the fact that during 1337–1338, 35 tombstones were erected, while during 1338–1339, the number was 83, implying that the catastrophe started towards the end of 1337–1338. Also, as Pantusov noted in his excavations diary, some plague-related graves contained multitudes of fossilised worm larvae, indicating that these individuals were buried in the summer/early autumn. Kara-Djigach cemetery, Graves 13, 28, 29, 34, 37, 55, 75, Chapel 2 Grave C (AIIMKRAN, F. 1, O. 1, D. 40b, fols. 10r, 14r–v, 15v, 16v, 24v–25r, 29r–v, 31v–32r). It should be noted that no presence of worm larvae was reported by Pantusov for non-plague graves.

⁸⁵ For mortality rates in different parts of Europe, see Benedictow, *The Complete History*, pp. 647–885; for the Middle East, see Borsch and Sabraa, 'Refugees'.

⁸⁶ Kozhemyako, *Rannesrednevekoye Goroda*, pp. 65–130.

⁸⁷ Calculated from R. Cesaretti, J. Lobo, L. M. A. Bettencourt, S. G. Ortman, M. E. Smith and J. A. Wrigley, 'Population-area relationship for Medieval European cities', *PLoS ONE* 11 (2016), e0162678. doi:10.1371/journal.pone.0162678, Appendix S1 Main Data. Medieval Cities Data.

⁸⁸ Maria A. Spyrou et al., 'Phylogeography of the Second Plague Pandemic revealed through analysis of historical *Yersinia pestis* genomes', *Nature Communications* 10 (2019), doi:10.1038/s41467-019-12154-0.

⁸⁹ Lee Mordechai, Merle Eisenberg, Timothy P. Newfield, Adam Izdebski, Janet E. Kay and Hendrik Poinar, 'The Justinianic plague: an inconsequential pandemic?', *PNAS* 116 (2019), doi/10.1073/pnas.1903797116. On evidence of the depletion of virulence genes in *Yersinia pestis* bacteria in early modern Europe, see J. Susat et al., '*Yersinia pestis* strains from Latvia show depletion of the *pl* virulence gene at the end of the Second Plague Pandemic', *Scientific Reports* 10 (2020), doi:10.1038/s41598-020-71530-9; A. Immel et al., 'Analysis of genomic DNA from medieval

Table 3. Sex ratios in Semirech'ye tombstones, 1248–1345.

	All tombstones	Male	Female	Unknown	Sex ratio
All non-plague years	349	202	145	2	1.39
All pre-plague years	308	177	130	1	1.36
Normal (non-crisis) years	161	91	69	1	1.32
Crisis years, except 1338–1339	188	111	76	1	1.46
1338–1339 (plague years)	118	58	58	2	1.00
1340–1345	41	25	15	1	1.67
All years	467	260	203	4	1.28

Source: Semirech'ye burials database.

claiming at least 50 per cent of local populations—and often figures were higher than that. Thus, it is *extremely* unlikely that some ten years would be sufficient for the plague strain to lose some of its virulence genes. In the absence of palaeogenetic data on virulence, however, this hypothesis cannot move beyond a speculative framework.

Who were the survivors of the plague? Were these a few lucky locals or new immigrants moving in after the crisis? Obviously, the scant and laconic nature of epitaphs cannot provide an adequate answer. However, there are at least two headstones hinting that at least some survivors were locals, rather than immigrants. One of these individuals was one 'Ilyā the priest, son of Yoḥannān (John) the priest' who died in 1339–1340 (1651). Ilya seems to have been a brother of Aoloṭako, son of Yoḥannān the priest, who had died in 1316–1317 (1628).⁹⁰ Another individual, Bačaq-Tärim, a young woman who was the daughter of Šadikim the priest, who died in 1340–1341 (1652), may have been the daughter of Šadikim the churchwarden, who perished in the plague.⁹¹ Another woman, called Qyamta, was designated as *Kaškarayā* (presumably, for *Kaškaraytā*), namely 'of Kashgar'.⁹² Hence, it is possible that there were some attempts to solve the demographic vacuum by encouraging immigration. However, the fact that no other individuals buried between 1340 and 1345 are designated as such by an immigrant surname (such as *Almāligayā*/*Almāligaytā*), together with the scant nature of the available material related to the plague survivors, does not allow for any further assumptions.

Sex ratios: non-plague years

A close analysis of the epigraphic evidence indicates that the Semirech'ye East Syriac population was a strongly male-dominated one. As Table 3 above shows, the normal mortality sex ratio was 1.39 in non-plague years and 1.46 in non-plague-related 'crisis' (excess mortality) years. These skewed sex ratios mirror, in a somewhat grotesque manner, the situation elsewhere in pre-Industrial Eurasia, as evidenced in both late-medieval Europe and in late-nineteenth and early twentieth-century Central Asia.⁹³ In fourteenth-

plague victims suggests long-term effect of *Yersinia pestis* on human immunity genes', *Molecular Biology and Evolution* 38 (2021), doi:10.1093/molbev/msab147.

⁹⁰ Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), nos. 28.1 (130) and 51 (117).

⁹¹ Chwolson, 'Syrischnestorianische Grabinschriften' (1897), nos. 208 and 163.

⁹² *Ibid.*, no. 211.

⁹³ See Pervaya Vseobščhaya Perepis' Naseleniya Rossiiskoi Imperii 1897 g., Vols. 84 and 85; the 1912 Chinese census data is tabulated in <http://www.ier.hit-u.ac.jp/COE/Japanese/discussionpapers/DP97.9/fhyo2.html> (accessed 19 July 2022).

century Western Europe, the ratio stood at around 1.15–1.20.⁹⁴ By the time of the 1897 Russian Imperial census, the sex ratio in the Semirech'ye and Semipalatinsk regions (*oblasti*), overlapping (roughly speaking) with today's Kyrgyzstan and Kazakhstan, stood at 1.16. In Uyghuristan/Xinjiang, it stood at 1.13, as the 1912 Chinese Republican census indicates.

It is unlikely, therefore, that the epigraphic evidence reflects the real sex ratio. Despite the fact that there were undoubtedly more men than women in Chaghadaid Semirech'ye, the figure of 1.39 in non-plague years nevertheless comes across as suspiciously high—in particular, given the fact that some better-off East Syriac men practiced polygamy, as mentioned by some Western contemporaries.⁹⁵ If that were the case, then we end up not only with a disproportionate surplus of men, but also with a disproportionate surplus of single men. Such a demographic composition would have precluded any prospect of fast population growth, even if we were to account for constant immigration. Hence, the available epigraphic evidence is likely to be biased and, thus, does not reflect the true ratio between the genders, which appears unlikely to have been higher than, say, 1.20.

The same problem of skewed sex ratios is reflected in archaeological finds from later medieval English cemeteries, where, in some instances, the figures were unrealistically high, standing at 1.50 and higher, even though late fourteenth-century tax records indicate a ratio of about 1.16.⁹⁶ As Maryanne Kowaleski has contended, those skewed sex-ratios, as indicated in burials (but also in censuses), should not be taken as the indication of a real shortage of women, but rather as a reflection of 'missing women', whose poverty may have prevented them from being given a proper burial in parish churchyards (or prompted them to evade paying taxes).⁹⁷

It is unclear why the sex ratio was so skewed here and what happened to all the 'missing women'. As Figures 3 and 4 indicate, there were neither gender- nor age-specific designated sections in the Kara-Djigach cemetery, implying that women were not excluded from cemetery burial. Moreover, even those considered 'sinful' were extremely unlikely to have been denied a cemetery burial: as we have seen, local converts to Islam were buried alongside their Christian relatives and neighbours—something that would not be likely in the Orthodox or Catholic contexts.

A further hint, however, may be provided by a comparison of sex ratios across different age groups. As Table 4 shows, the ratios were unrealistically high within the sub-adult group—standing at 1.85, if accounting for all non-plague years, or 2.13, if considering only the pre-plague period. By contrast, the respective figures within the adult group stood at 1.34 and 1.27, which were undoubtedly closer to real sex ratios. In other words, there is a problem of, specifically, 'missing' young women. One possibility is that the graves of some younger women, in contrast with their adult counterparts, would not be endowed with tombstone epitaphs—possibly because of their worse-off socio-economic status. If that was the case, then a non-negligible proportion of younger women remain 'undocumented' or 'missing'—just as they were in late-medieval England.⁹⁸ In other words, the collected and published epitaphs may not reflect the true sex ratio of people buried at the Semirech'ye cemeteries. In the absence of any additional data, however, this hypothesis cannot be taken any further.

⁹⁴ Kowaleski, 'Gendering demographic change', pp. 183–184; S. Bardsley, 'Missing women: sex ratios in England, 1000–1500', *Journal of British Studies* 53 (2014), pp. 273–309.

⁹⁵ Jackson (trans.), *Mission of Friar William*, p. 163.

⁹⁶ Bardsley, 'Missing women', p. 287.

⁹⁷ M. Kowaleski, 'Medieval people in town and country: new perspectives from demography and bioarchaeology', *Speculum* 89.3 (2014), p. 579.

⁹⁸ For the problem of 'missing women' in later medieval English documents and burial sites, see Kowaleski, 'Medieval people', pp. 573–600.

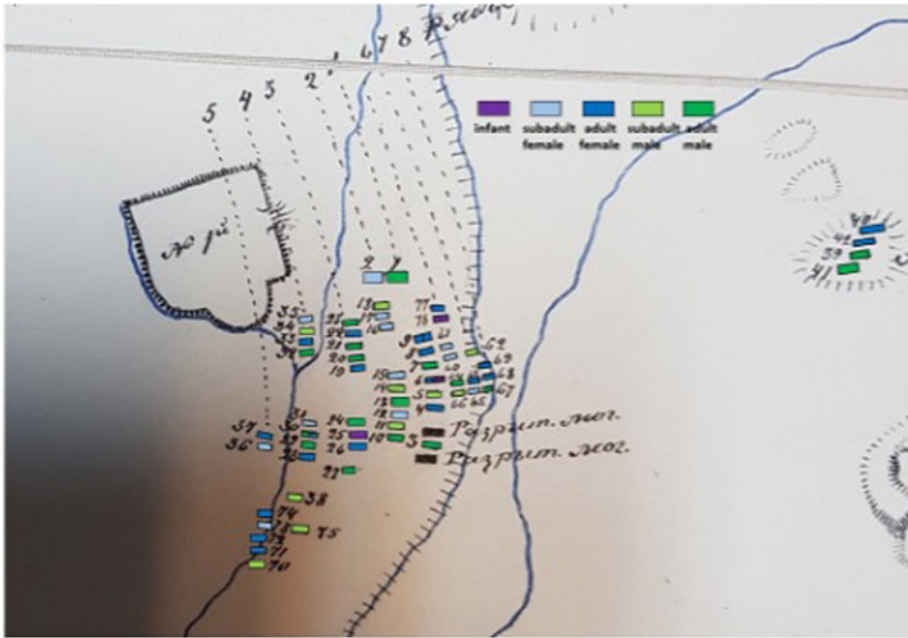


Figure 3. The main segment of the excavated part of the Kara-Djigach (graves 1–41, 60–77). Part of the cemetery plan, drawn by Afanas'yev for Pantusov in 1886. Source: *AllMKRAN*, F. I, O. I, D. 40b.

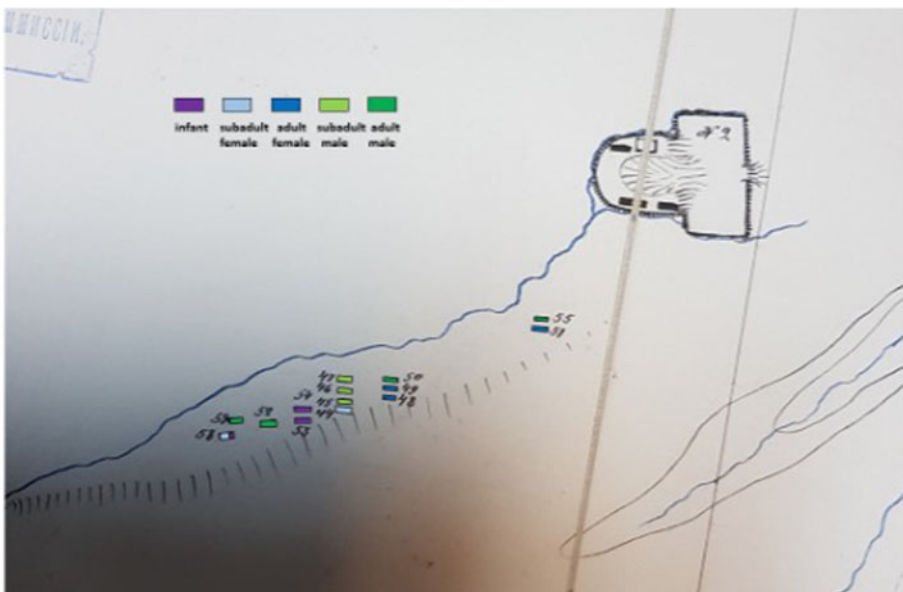


Figure 4. The northern segment of the excavated part of the Kara-Djigach (graves 44–55, 58–59). Part of the cemetery plan, drawn by Afanas'yev for Pantusov in 1886. Source: *AllMKRAN*, F. I, O. I, D. 40b.

Table 4. Age-specific sex-selectivity mortality patterns in Semirech'ye, 1248–1345.

	All tombstones, sexed	Sub-adults	Adults
All non-plague years	347	1.85	1.34
All pre-plague years	307	2.13	1.27
Normal (non-crisis) years	160	1.73	1.25
Crisis years, except 1338–1339	187	1.94	1.44
1338–1339 (plague years)	116	1.00	1.00
1340–1345	40	1.11	2.50
All years	463	1.51	1.26

Source: Semirech'ye burials database.

Sex- and age-selectivity in mortality crises

One main finding deriving from the analysis of the Semirech'ye corpus, shown in Table 2, is that there was a significant decline in the sex ratio during the 1338–1339 plague epidemic. In other words, a far larger proportion women were dying in the course of the plague outbreak than in other years, be it 'normal' or 'excess' mortality (that is, other mortality crises years).

The sex ratio fell drastically from 1.39 in non-plague years (or 1.36 in pre-plague years) to just 1.00 during the plague outbreak; namely, there was a gap of about 0.39 (or 0.36) between non-plague and plague years. This difference conforms to the findings by Curtis and Roosen for late-medieval Belgium, which showed a similar fall from 1.18 in non-plague years to 0.94 during plague outbreaks in Hainault between 1349 and 1450 (namely, the gap of 0.24 between the sex ratios in non-plague and plague years).⁹⁹

Although the decline in sex-ratio mortality is clearly detectable across the entire sample of dated burials, it appears especially pronounced within the sub-adult group, falling from 2.13 if accounting for all the pre-plague years, or 1.73 if accounting for non-crisis years only, to the remarkably low figure of 1.00 (Table 4). This is in contrast with a less notable fall from the respective values of 1.27 (if accounting for 'normal mortality' years only), or 1.25 (if accounting for non-plague years only), to 1.00 in the case of adults. In other words, although women were more susceptible to plague than men across all age groups, they were especially susceptible within the sub-adult cohort.

A close analysis of sex-selectivity mortality patterns within sub-adult and adult cohorts in non-plague crisis years reveals changes, too. As Table 4 indicates, there was an increase in sex ratio within the sub-adult cohort in non-plague crisis mortality years, with the figures rising from 1.73 to 1.94. Similarly, the figures rose from 1.25 to 1.44 within the adult group. In other words, during these short-term episodes of excess mortality, most of which seem to have been connected to subsistence crises, both young and adult men were particularly susceptible. As we shall see below, this, again, conforms to age-specific patterns in famine mortality, as numerous historical examples demonstrate.

Explaining the pronounced fall in sex ratios during the 1338–1339 plague outbreak is by no means straightforward, as it is unclear whether it was linked to socio-cultural (endogenous) or biological (exogenous) factors. When accounting for socio-cultural factors, it is important to consider gender-specific roles. As some studies of late-medieval

⁹⁹ Curtis and Roosen, 'Sex-selective'.

England and the Low Countries have shown, women's domestic functions, related to household caregiving tasks, requiring that they spent disproportionate amounts of time in houses, may have exposed them more than men, whose gender-specific roles required them to conduct their work outdoors, or at least outside their houses.¹⁰⁰ As we have seen above, we know very little about the occupations and gender roles of the Christian communities of Semirech'ye, apart from their involvement in ecclesiastical roles, international trade, financing, and crafts. These, however, can hardly be correlated with plague spread mechanisms. As we have seen, some East Syriac households may have been involved in agriculture. Crop cultivation and livestock herding were predominantly male activities, implying that local men would spend more time outdoors than their mothers, wives, sisters, and daughters. In the Semirech'ye context, this would imply an elevated, rather than lowered, risk of men's exposure to plague, given their proximity to infected rodents, primarily marmots, but also a range of 'secondary' plague hosts—mice, voles, susliks, hamsters, stoats, polecats, hares, foxes, and badgers.¹⁰¹ Yet this was not the case here, given the disproportionately high mortality of women.

Conversely, we can assume that local women's tasks were related primarily to household caregiving, similarly to their counterparts in Western Europe. The disproportionate concentration of women in a close work environment within their houses could be intensified further by the fact that some better-off East Syriac men practised polygamy.¹⁰² This could potentially encourage the human-to-human spread of plague, either via ectoparasites (bubonic) or directly (pneumonic). In other words, the fact that both men and women were, at least in theory, equally exposed to plague (men via direct contacts with rodent plague hosts and women via contacts with other household members) is at odds with disproportionate plague mortality among women.

If socio-cultural factors do not sufficiently explain the impact of plague outbreak on falling sex ratios, we may turn to an alternative 'biological' or 'intrinsic' mechanism explanation. This idea can be tested, once we disaggregate the gendered burials into their respective age groups and take into account the biological mechanism explanation. As we have seen, it was young women who were particularly susceptible to plague. One possible explanation for the higher risk of plague exposure in younger women is pregnancy. The age of first marriage in late-medieval East Syriac communities was lower than in Catholic Europe: according to the *Nomocanon* of Abdisho bar Berika of Nisibis (d. 1318), it was normally 14, but no lower than 12, for girls.¹⁰³ Similarly, the *Nomocanon* of Bar Hebraeus (1226–1286) decreed that the age of majority was 12 for girls and 14 for boys.¹⁰⁴ The early age of marriage in East Syriac communities in early nineteenth-century Persia was reported by Justin Perkins (1805–1869), an American Presbyterian missionary and Orientalist, who stated that it stood at between 13 and 15

¹⁰⁰ C. Rawcliffe, *Medicine and Society in Later Medieval England* (Stroud, 1995), pp. 182–183; Curtis and Roosen, 'Sex-selective'.

¹⁰¹ V. V. Kut'yev and A. Yu. Popova, *Kadastr Epidemicheskikh i Epizooticheskikh Proyavlenii Chumy na Territorii Rossijskoi Federatsii i Stran Blizhnego Zarubezh'ya s 1876 po 2016 gg.* (Saratov, 2016), pp. 76–85. For the most comprehensive survey of all mammals and birds capable of being infected and spreading plague, see Ahmad Mahmoudi, Boris Krystufek, Alexander Sludsky, Boris Schmid, Alzira Almeida, Xu Lei, Beza Ramasindrazana, et al. 'Plague reservoir species throughout the world', *Integrative Zoology* 16, no. 6 (2021), pp. 820–833.

¹⁰² Jackson (trans.), *Mission of Friar William*, p. 163.

¹⁰³ Translated into Latin as *Ebediesu Collectio Canonum Synodicorum*, in *Scriptorum veterum nova collectio e vaticanis codicibus edita* 10, (ed.) A. Mai (Rome, 1838), p. 44 (Tractatus II: IV).

¹⁰⁴ P. Bedjan (ed.), *Nomocanon Gregorii Barhebraei* (Paris, 1898), pp. 160–161; translated into Latin as *Gregorii Abulpharagii Bar-Hebraei Nomocanon*, in *Scriptorum veterum nova collectio e vaticanis codicibus edita* 10, (ed.) A. Mai (Rome, 1838), p. 83 (Cap. IX, Sect. 1).

for girls and between 15 and 17 for boys.¹⁰⁵ Coupled with the fast demographic growth of the Semirech'ye communities between *circa* 1248 and 1345, and high rates of infant mortality, it appears that the *'laymtā* cohort was particularly fertile, with young women capable of bearing several children before reaching the age of 20. As several studies have shown, contracting plague is highly dangerous for both expectant mothers and their foetuses; without timely antibiotic intervention, the infection of the placenta will result in miscarriage or premature stillbirth and, subsequently, in a perinatal death.¹⁰⁶ Indeed, there is at least one grave where remains of a foetal skeleton were found around the pelvic region of an unidentified woman, presumably indicating the 'coffin birth' phenomenon.¹⁰⁷ It should be noted that only 'mature' foetus skeletons (that is, close to or around a delivery date) tend to be preserved in soil, whereas the bones of 'younger' foetuses, because of their frailty and underdevelopment, are prone to fast post-mortem disintegration. Therefore, most miscarriages and stillbirths caused by maternal plague contraction will not be identifiable as far as archaeological evidence is concerned.

The elevated risk of plague mortality in young women has also been shown for other historical outbreaks. Thus, during the 1630 outbreak in Nonantola, the sex ratio within the 15–19 age group fell from 1.3 in 'normal' years on the eve of the plague to 1.1.¹⁰⁸ Similarly, during the 1452 and 1523 outbreaks in Milan, young women faced an increased risk of death compared to their brothers and husbands. Alfani and Cohn, and Alfani and Bonetti have argued that the elevated risk of plague mortality in young women was related to the beginning of their fertility and pregnancy period after puberty.¹⁰⁹ The average age of menarche in late-medieval and early modern northern Italy was 14, while the average age of first marriage was 16 for young women. This was perhaps a bit higher than among Central Asian East Syriac Christians, but not high enough to make much of a difference, given that not every potential bride aged 13–15 would have been fertile. Likewise, during seventeenth-century plague outbreaks in England, mortality rates were the highest among pregnant women.¹¹⁰ In other words, early pregnancies of young women may have played a paramount role in the decreased sex ratio.

Biological factors seem to have been as decisive in other crisis years. As we have seen, the sex ratio rose *visibly* from 1.73 in non-crisis years to 1.94 within the sub-adult cohort, and from 1.25 in non-crisis years to 1.44 within the adult group (Table 4). In other words, young and adult men were disproportionately vulnerable to these short-term mortality crises, most of which seem to have been related to climatic shocks and subsistence crises (Supplementary material, Appendix 1). This trend conforms to the 'female advantage mortality' phenomenon spotted in some historical famines—in most instances, sex ratios rise dramatically within adult cohorts. Thus, the sex ratios in famine-related contexts in the respective age cohorts of 1–19 and 20–59 stood at 1.06 and 1.14 during the Finnish famine of 1832–1833; 1.05 and 1.32 during the 1932–1933 famine in Ukraine; 0.99 and 1.73, and 1.56 and 2.10, respectively, on the islands of Hios and Syros during the Greek famine of 1941–1942; and at 0.64 and 1.42 during the 1974–1975 famine in

¹⁰⁵ J. Perkins, *A residence of eight years in Persia, among the Nestorian Christians* (Andover, 1843), p. 237.

¹⁰⁶ J. M. Mann and R. Moskowitz, 'Plague and pregnancy. A case report', *JAMA* 237 (1977), pp. 1854–1845; T. K. Welty et al., 'Nineteen cases of plague in Arizona. A spectrum including *Ecthyma Gangrenosum* due to plague and plague in pregnancy', *Western Journal of Medicine* 142 (1985), pp. 641–646.

¹⁰⁷ Kara-Djigach cemetery, Grave 58 (AIIMKRAN, F. 1, O. 1, D. 40b, fol. 25v).

¹⁰⁸ Alfani and Bonetti, 'Survival analysis'.

¹⁰⁹ G. Alfani and S. K. Cohn, 'Nonantola 1630. Anatomia di una pestilenza e meccanismi del contagion', *Popolazione e Storia* 2 (2007), pp. 108–109; Alfani and Bonetti, 'Survival analysis', p. 114.

¹¹⁰ Slack, *Impact of plague*, pp. 185, 289; S. Scott and C. Duncan, *Biology of Plagues: Evidence from Historical Populations* (Cambridge, 2001), p. 139.

Bangladesh.¹¹¹ Similarly, during the Tenpō famine in Japan (1833–1837), the respective figures for the age cohorts of 15–29 and 44–59 stood at 0.92 and 1.52.¹¹²

It has been suggested that adult women tend to perish in famines in smaller proportions than adult men because of their biological and physiological mechanisms. Firstly, oestrogen makes adult women better suited to resist famine-related diseases (chiefly typhoid). Secondly, adult women's bodies are smaller and lighter, with a slower metabolism and a larger proportion of natural fat content, compared to those of their male counterparts.¹¹³ Although there is much evidence of 'female advantage famine mortality', it should not always be taken for granted: for instance, during the 1590s crisis in England and the Great Irish Famine of 1845–1852, the differences in mortality ratios between the sexes was barely noticeable.¹¹⁴

Implications of sub-adult female mortality in Semirech'ye

The disproportionately high mortality rates in young women during the plague outbreak and that in young men during excess mortality crises implied that the relative share of sub-adult deaths in all deaths went up in both instances, compared to 'normal' years (Tables 2 and 4). This is largely comparable with other historical plague outbreaks and famines. In the case of plague, this trend can be discerned in the skeletal assemblages from late-medieval London, where the proportion of sub-adults aged 20 and below from non-plague burials, the Black Death, and *pestis secunda* cemeteries stood at, respectively, 35, 49, and 51 per cent.¹¹⁵ Similarly, in Nonantola the annual share of sub-adult deaths (aged 20 or below) in all deaths rose from 17 per cent in 1623–1629 to 46 per cent during the 1630 outbreak.¹¹⁶ As far as subsistence crises are concerned, young people tended to fare worse than adults during the English food crises of 1557–1559, 1597, 1603, and 1623–1625; the Finnish famines of 1831–1832 and 1857; the Tenpō famine in Japan (1833–1837); the Great Irish Famine of 1845–1852; the Russian food crises of 1868, 1882, and 1905; the Soviet famine of 1946–1947; and the Bangladeshi famine of 1974–1975.¹¹⁷

By targeting women, and especially young women, the plague outbreak of 1338–1339 wiped out the single most fertile cohort within the Semirech'ye community, skewed the gender ratio most unfavourably, and thus destroyed any prospect of biological reproduction within the same communities. The survivors of the plague were primarily men, both young and adult. Indeed, as Table 4 indicates, in the aftermath of the plague (1340–1345),

¹¹¹ K. J. Pitkänen, 'Famine mortality in Finland: is there a sex bias?', in *Famine Demography: Perspectives from Past and Present*, (eds) T. Dyson and C. Ó Gráda (Oxford, 2002), pp. 89–90; S. Adamets, 'Famine in nineteenth and twentieth century Russia: mortality by age, cause and gender', in *Famine Demography*, (eds) Dyson and Ó Gráda, p. 175; V. Hionidou, 'Send us food or coffins': the 1941–43 famine on the Aegean Island of Syros', in *Famine Demography*, (eds) Dyson and Ó Gráda, pp. 195–197; T. Dyson, 'On the demography of South Asian famines, Part II', *Population Studies* 45 (1991), pp. 279–297.

¹¹² A. B. Jannetta, 'Famine mortality in nineteenth-century Japan: the evidence from a temple death register', *Population Studies* 46 (1992), p. 435.

¹¹³ J. Healey, 'Famine and the female mortality advantage: sex, gender and mortality in Northwest England, c. 1590–1630', *Continuity and Change* 30 (2015), p. 155.

¹¹⁴ *Ibid.*; C. Ó Gráda, *Ireland before and after the Famine: Explorations in Economic History, 1800–1925* (Manchester, 1993), p. 109; C. Ó Gráda, *Famine: Short History* (Princeton, 2009), pp. 94–95.

¹¹⁵ DeWitte and Kowaleski, 'Black Death bodies', pp. 6–15, 18, 23.

¹¹⁶ Alfani and Bonetti, 'Survival analysis'.

¹¹⁷ S. Scott and C. Duncan, 'Infant mortality and famine: a study in historical epidemiology in northern England', *Journal of Epidemiology and Community Health* 49 (1995), pp. 245–252; S. Scott and C. Duncan, 'The mortality crisis of 1623 in North-West England', *Local Population Studies* 58 (1997), pp. 14–25; Pitkänen, 'Famine mortality', pp. 89–90; Jannetta, 'Famine mortality', p. 435; Ó Gráda, *Ireland*, p. 109; Adamets, 'Famine', p. 175; Dyson, 'Demography', p. 291.

the sex ratio within the adult cohort stood at 2.50, which is considerably higher than 1.25 in 'normal' (non-crisis) mortality years. To make things even worse, given the exorbitantly high mortality rates of about 75 per cent during the plague outbreak, there were very few survivors. Indeed, between 1340 and 1345, only 41 tombstones were erected—19 for younger people (ten boys/young men and nine girls/young women), and 21 for adults (15 men and six women, some of whom were still sub-adults during the plague outbreak); neither the gender nor the age group of an additional individual can be determined, because of the fractured state of the epitaph.

In other words, the unfortunate combination of excessively high mortality rates and gender-/age-selectivity implied that the Semirech'ye community was either to undergo a very long period of demographic replenishment, or to become extinct in the event of an additional mortality crisis. Unfortunately, it was the latter rather than former: in 1341–1342, a further 36 out of 37 documented survivors of the plague died under uncertain circumstances. One possibility is the ongoing persecutions of local Christian communities, commencing with the martyrdom of Almaliq Christians in 1339 or 1340 at the hands of 'Alī Sulṭān, a Muslim pretender to the Chaghadaid throne. However, this scenario is not likely, given that after 'Alī Sulṭān's death in 1340 or 1341 (most likely in later 1340), the persecutions seem to have stopped (see Supplementary material, Appendix 1). Another scenario is that we are dealing with the second wave of the plague, as has been already suggested by Uli Schamiloglu.¹¹⁸ At first, the possibility that human plague came back in just three years may not appear to be very likely: as the evidence from mid-to late-fourteenth-century Europe shows, the plague would come in waves every seven to ten years from its Central German reservoir.¹¹⁹ Now that it has been established that the Kara-Djigach outbreak represents the very beginnings of the Black Death (and the Second Plague Pandemic in general), however, it is possible that the pathogen may have been both more virulent and persistent compared to later waves (see Supplementary material, Appendix 1, '(13) The crisis of 1341–1342'). Whatever the crisis was, only a few individuals seem to have survived it and after 1345 the communities of Kara-Djigach and Burana ceased to exist, judging by the absence of later tombstones.¹²⁰ The abandonment of Kara-Djigach in the 1340s is reflected not only in the epigraphic timeframe, but also in numismatic chronology: as Figure 5 indicates, the latest coin found on the site is from 741 AH (=1340–1341 CE).

It is unlikely, however, that the communities died out completely because of the plague and the ensuing demographic fall. After all, at least one person (or perhaps several) had to be left after the last burial to erect the tombstone. One possibility is that there were few inhabitants who left their homes and migrated elsewhere, perhaps unwilling to convert to Islam and fleeing potential persecution by the authorities of Qazan Qan (1343–1346) and Amir Qazaghan (1345–1358), who worked to impose Islam on their subjects. As surviving tombstones from Almaliq (21 in number) suggest, a local East Syriac community thrived in the 1350s and 1360s, with the last stone erected in 1371–1372. It should be noted that unlike his predecessors, Tughluq Timur, a Muslim Qan of Moghulistan (*circa* 1347–1363) and the whole of the Chaghadaid ulus (*circa* 1360–1363), was tolerant towards both Christians and Buddhists. Given the toponymic surnames *Almāliqayā/Almāliqaytā* and *Kaškarayā/Kaškaraytā* of some individuals buried in Kara-Djigach, it is likely that there

¹¹⁸ Schamiloglu, 'End of Volga', pp. 161–162.

¹¹⁹ Slavin, 'Out of the West', pp. 41–43.

¹²⁰ The year 1344–1345 (1656) relates to the last stone at Kara-Djigach (the grave of Somā the Priest): see Chwolson, 'Syrisch-Nestorianische Grabinschriften' (1890), no. 56 (205). The latest dated epitaph at Burana (a Turkic inscription from the grave of one Ṭāp-Tārim) is actually from 1340–1341 (1652): see Dzhumagulov, *Yazyk*, pp. 87–90. Obviously, the paucity of dated Burana stones does not allow us to conclude that life in the Burana community ended a few years before it did at Kara-Djigach.

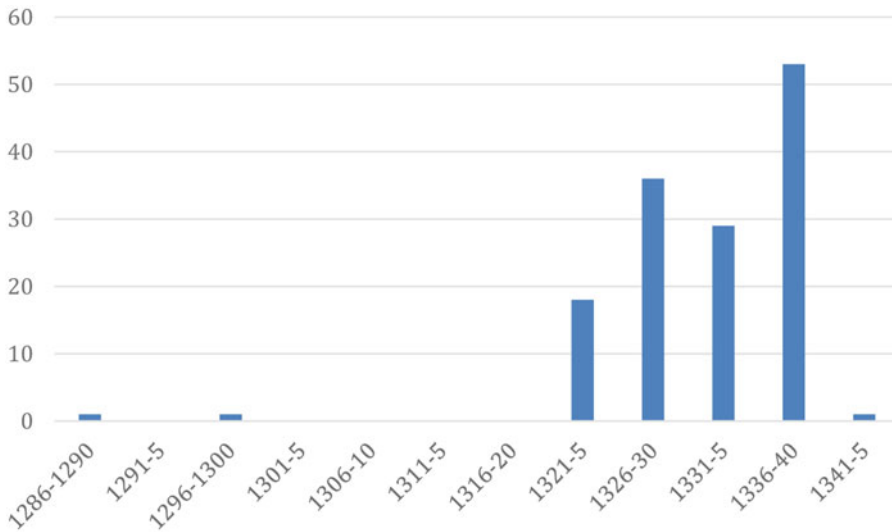


Figure 5. Chronological breakdown of two Kara-Djigach Chaghadaid-era coin hoards. Source: Spyrou et al., 'Source'; Fedorov, 'Hoard'; Ochkasov, 'Komplekt monet'.

were some kinship links between the Semirech'ye and East Syriac Christians of Almaliq and Kashgar, prompting the former to migrate to these cities after 1345. The situation in Almaliq and Kashgar became tense again in the 1370s, in the context of Tamerlane's campaigns, particularly his devastating raids in the Almaliq region in 1375, followed by the ransacking of Kashgar in 1389–1390.¹²¹ The absence of post-1372 stones from Almaliq may indeed reflect the end of the East Syriac community in the city in the context of Tamerlane's fiercely anti-Christian (and indeed anti-Buddhist and anti-Hinduist) policies.

Conclusions

The analysis of the unique corpus of late-medieval epitaphs from Semirech'ye offers a unique glimpse into pre-modern Central Asian demography, on the one hand, and a contribution to our existing knowledge of plague demography, on the other. On a basic level, it reveals the fast growth, then a sudden decline and vanishing of a multicultural community of East Syriac Christians in Chaghadaid Central Asia. As we have seen, it grew very fast between *circa* 1270s and 1300s; on the eve of the plague, it boasted a population of about 1,250 people. Such a fast growth was possible thanks to a permanent influx of new immigrants from other parts of Central Asia and possibly beyond. The growth of a Central Asian Christian community is at odds with gloomy depictions of Mongol conquests and the destruction of local populations. If anything, the attitude of Mongol authorities towards East Syriac and other Christians varied from tolerance to respect and admiration and, in some isolated cases, conversion. Some campaigns of Chaghadaid rulers may have resulted in the massacre of some local community members and intermittent demographic setbacks, but these had nothing to do with their religion.

The sudden arrival of the plague in summer 1338 resulted in the death of about three-quarters of local community members, in the space of just one year. A close analysis of the epigraphic data corroborates the idea that plague was selective with regard to both the

¹²¹ O. Karayev, *Chagataiskii Ulus. Gosudarstvo Khaidu. Mogulistan* (Bishkek, 1995), pp. 54–57.

sex and the age of its victims. Specifically, it tended to kill disproportionately more women than men, and more sub-adults than adults. When regarding the effects of plague across both genders and age groups, it appears that the plague was particularly virulent in young women: as we have seen, the sex ratio within the sub-adult cohort buried at the Kara-Djigach cemetery fell from 2.13 in the period 1248–1337 to 1.00 during the plague. Obviously, the highly skewed sex ratios are to be approached with caution and not be taken at face value. At the same time, there is no question that the sharp decline, however unrealistic, still reflects the fact that plague tended to be particularly devastating in young women.

These patterns are in agreement with other historical plagues in pre-Industrial Europe. This striking similarity, notwithstanding different chronological, geographic, and cultural contexts, may lend credibility to the idea that ‘female disadvantage plague mortality’ may have been a product of intrinsically biological, rather than socio-cultural, differential factors. Naturally, in absolutising biology as a singular variable, one inevitably runs the risk of falling into the trap of determinism. Hence, both biology and culture need to be considered; yet, the relative contribution of each variable may not be equal, and it is possible that the former was a more heavy-weighted factor than the latter. Such a cautious approach is in line with the recent view of Curtis and Roosen. As the authors have commented in reference to late-medieval Hainault, ‘we still know relatively little about the daily behaviour of men and women in the medieval period’.¹²² By contrast, it would not be an exaggeration to say that we know virtually nothing about the daily lives and behaviour of men and women in fourteenth-century Semirech’ye, which was ethnically, religiously and culturally much more diverse than the late-medieval Low Countries.

‘Female disadvantage plague mortality’ stands diametrically in contrast with ‘female advantage famine mortality’. This is reflected in the inverse trends in sex ratio between plague mortality and other excess mortality shocks, most of which are taken to be related to subsistence crises. Again, the heightened mortality ratio corroborates our knowledge about famine mortality, whereby adult men tend to die disproportionately more than their wives and sisters. Again, biological differentials seem to play a paramount role in this phenomenon, as some studies have indicated.

Although the analysis of the Semirech’ye data may answer some questions, it also poses some additional ones. If we stick to the biological interpretation of ‘female disadvantage mortality’ during plague, then what factors, apart from pregnancy, account for this disadvantage? Given that not all younger women were fertile around the plague time, pregnancy alone can hardly explain it. Did other mechanisms, such as oestrogen, post-partum frailty, and lactation play a role? Or was it about some biological peculiarities in men that gave the latter some immunological advantage over their female counterparts? These links between gender-specific biological differentials and plague mortality, convincing yet hypothetical, are begging to be studied by multidisciplinary teams of historians, palaeopathologists, immunologists, and molecular biologists.

Another point to consider is pre-existing health conditions of both men and women. As recent work by Sharon DeWitte and her colleagues has shown, frailer individuals exhibiting physical stress markers were more likely to die during the Black Death, as the evidence from East Smithfield, London, demonstrates.¹²³ Indeed, England and other parts of

¹²² Curtis and Roosen, ‘Sex-Selective’, p. 11

¹²³ S. DeWitte, ‘Age patterns of mortality during the Black Death in London, A.D. 1349–1350’, *Journal of Archaeological Science* 37 (2010), pp. 3394–3400; S. DeWitte and S. Hughes-Morey, ‘Stature and frailty during the Black Death: the effect of stature on risks of epidemic mortality in London, A.D. 1348–1350’, *Journal of Archaeological Science* 39 (2012), pp. 1412–1419; S. DeWitte and P. Slavin, ‘Between famine and death: physiological stress and dairy deficiency in England on the eve of the Black Death (1315–50): new evidence from paleoepidemiology and manorial accounts’, *Journal of Interdisciplinary History* 44 (2013), pp. 37–60; S. DeWitte and J. Wood,

northwestern Europe had experienced the Great Famine of 1315–1317, the Great Bovine Pestilence of 1319–1321 and subsequent dairy intake deficiency, as well as declining living standards, all setting the stage for the devastating impact of the plague. But if our exogenous interpretation of non-plague mortality crises in Semirech'ye in Supplementary material, Appendix 1 is correct and the local communities experienced harsh winters, excessively damp or dry summers, crop destruction, livestock mortality, and ensuing starvation in the pre-1338 era, then much the same stage for the plague has been set there. As we have seen, during those short-term episodes of subsistence crises, adult men died disproportionately more than both adult women and young people. Could it be that the female survivors of those short-term crises had immune systems that had been compromised to the point that they could not resist the plague bacteria? As for the previous issue, the question of the impact of pre-existing stress on pandemics, although studied by several scientists, still awaits a thorough historical, immunological, and microbiological investigation.¹²⁴ It is yet another example of where humanists, archaeologists, and scientists should join hands and work together, in order to answer this and other pressing questions in plague studies.

The issue of pre-existing health conditions, in the context of late-medieval plague outbreaks, is closely related to the so-called 'Fourteenth Century Crisis'. For decades, historians have talked about this phenomenon, focusing primarily on Western and Central Europe, without considering other parts of the world. In Europe, the essence of the crisis consisted of various manifestations—exogenous, demographic, and endogenous.¹²⁵ The exogenous aspects included the transitional period from the Medieval Warm Anomaly (MWA) to the Little Ice Age (LIA), characterised by gradual cooling and short-term weather anomalies that resulted in increasing incidence of harvest failures and food shortages for both humans and livestock. The rapid population growth in the two preceding centuries or so led to the Malthusian Crisis (overpopulation in relation to the available land resources), falling living standards, and growing poverty. The already dire situation was aggravated further by purely anthropogenic factors, such as market malfunctioning, taxation, and ongoing warfare, which resulted in the further dwindling of food resources. One clear outcome of this adverse combination of climatic deterioration, demographic pressure, and institutional setbacks was the occurrence of harsh subsistence crises, most notably the Great European Famine of 1315–1317, and Mediterranean famines of 1328–1329, 1333, 1346, and 1374–1375. When the plague arrived in Europe in 1347, it found an already weakened population, easily susceptible to pathogens.

A close analysis of the Semirech'ye data reveals clear signs of a society in crisis, which mirrors the situation in Europe. As some studies have shown, large-scale climatic deterioration, resulting in short-term climatic shocks and economic crises, dominated Central

'Selectivity of Black Death mortality with respect to pre-existing health', *Proceedings of the National Academy of Sciences* 105 (2008), pp. 1436–1441.

¹²⁴ F. Crespo and M. Lawrenz, 'Heterogeneous landscapes and medieval plague: an invitation to a new dialogue between historians and immunologists', *Medieval Globe* 1 (2014), pp. 229–257.

¹²⁵ Secondary literature on the 'Fourteenth-Century Crisis' in Europe is too vast to be surveyed here. See, for instance, B. Campbell (ed.), *Before the Black Death: Studies in the Crisis of the Early Fourteenth Century* (Manchester 1992); John Drendel (ed.), *Crisis in the Later Middle Ages: Beyond the Postan-Duby Paradigm* (Turnhout, 2015); Campbell, *Great Transition*; I. Kershaw, 'The great famine and agrarian crisis in England, 1315–22', *Past and Present* 59 (1973), pp. 3–50; P. Slavin, *Experiencing Famine in Fourteenth-Century Britain* (Turnhout, 2019); T. Newfield, 'A cattle panzootic in early fourteenth-century Europe', *Agricultural History Review* 57.2 (2009), pp. 155–190; P. Slavin, 'The great bovine pestilence and its economic and environmental consequences in England and Wales, 1318–50', *Economic History Review* 65.4 (2012), pp. 1239–1266; P. Slavin, 'Warfare and ecological destruction in early fourteenth-century British Isles', *Environmental History* 19 (2014), pp. 528–550.

Asia and Yuan China during the Mongol period.¹²⁶ Just as different regions of northern Europe experienced major outbreaks of panzootics, such as Rinderpest in cattle and scab in sheep, Central Asia, too, suffered heavy losses of livestock, seemingly caused by short-term weather anomalies. Just as Scottish raiders in North England *circa* 1320 or English soldiers in France *circa* 1340, Chaghadaid and Yuan horsemen, too, engaged in environmental destruction in the Semirech'ye region, in the course of their campaigns, systematically depriving local communities of land resources. As this study has postulated, most of the excess mortality spikes in non-plague years seem to have been connected to some sort of short-term subsistence crises, caused by a combination of exogenous and endogenous factors (see Supplementary material, Appendix 1). In both Europe and Central Asia, the Fourteenth-Century Crisis culminated with the advent of the single most notorious human killer—plague, which killed an astonishingly high proportion of local populations. Ironically, the plague is regarded by some historians as *deus ex machina*, solving the crisis by relieving humans of their demographic and socio-economic burdens, thus allowing them to escape from the 'Malthusian' trap. While the Fourteenth-Century Crisis has not received proper attention and treatment by the historians of the Mongol Empire, it is clear that it should no longer be treated as a uniquely European phenomenon. In recent years, there has been an increasing awareness that the Black Death cannot be fully appreciated, unless studied from a global and multidisciplinary perspective.¹²⁷ The same thing can be said about the wider Fourteenth Century Crisis.¹²⁸

Supplementary material. To view supplementary material for this article, please visit <https://doi.org/10.1017/S135618632200044X>.

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¹²⁶ N. Munkuyev, 'Novye materialy o polozhenii Mongol'skikh aratov v XIII–XIV vv', in *Tataro-Mongoly v Azii i Yevrope. Sbornik statei*, (ed.) S. L. Tikhvinskii (Moscow, 1977), pp. 409–446; Tana Li, 'The Mongol Yuan dynasty and the climate, 1260–1360', in *The Crisis of the 14th Century—Teleconnections between Environmental and Societal Change?*, (eds) M. Bauch and G. J. Schenk (Berlin, 2020), pp. 153–168.

¹²⁷ Green, 'Taking "pandemic" seriously'; Slavin, 'Death by the lake'.

¹²⁸ The first welcome step in this direction is Campbell, *Great Transition*.

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