Ekonomi-tek, Volume 12, Number 2, 2023, 35-76

Received: February 17, 2023 *Accepted: September 18, 2023* *Research Article*

Unofficial user's guide to the household labor force survey, Turkey

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Abstract

This paper offers a summary of the evolution of the Household Labor Force Survey (HLFS) and is intended to serve as an informed guide to users of micro-data drawn from it. HLFS has an address-based sample frame suitable for studying the non-institutional population. Major revisions to the sampling frame and the survey instrument are discussed and their implications for empirical work are addressed. Challenges ushered in by the choice of the non-institutional population as the target are underscored. Since 2000 the data-collection effort has been based on a rotating sample frame which involves up to four visits to the same address. This ushers in attrition problems, but it also produces short panels that offer additional opportunities for research on labor market dynamics that can inform and guide economic policies. The short panel components of the HLFS are currently beyond the reach of micro-data users because of TurkStat's data dissemination policy.

JEL Codes: C80, C18, J01

Keywords: household survey, non-institutional population, rotating sample frame, short panel, non-response, attrition, reverse attrition, non-ignorability, selectivity, weighting

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Hanehalkı işgücü anketi resmi olmayan kullanım kılavuzu, Türkiye

Öz

Hanehalkı İşgücü Anketinin (HİA) evriminin bir özetini veren bu makale aynı zamanda mikro veri kullanıcıları için bir kılavuz kaynak olmayı hedeflemektedir. HİA kurumsal olmayan nüfus üzerinden işgücü analizleri yapmak için tasarlanmış adrese dayalı bir örnek çerçevesine sahiptir. Makalede örnek çerçevesindeki ve soru kağıdındaki ana değişiklikler gözden geçirilmekte, bunların ampirik çalışmalar üzerindeki etkileri irdelenmekte ve kurumsal olmayan nüfusun hedeflenmesinden kaynaklanan zorluklar vurgulanmaktadır. Veriler 2000 yılından başlayarak dönen bir örnek çerçevesi kullanılarak toplanmaktadır. Tasarım aynı adrese en fazla dört ziyaret hedeflemekte ve kısa paneller yaratmaktadır. Bu kurgu bir yandan kayıpranma sorununa yol açarken, diğer yandan ekonomik politikaların seçiminde yol gösterecek dinamik araştırmalara zemin hazırlamaktadır. Ne var ki TÜİK'in veri paylaşım politikası HİA'nın kısa panel içeriğine erişime izin vermemekte, eziyetli ve masraflı saha çalışmalarından elde edilen zengin verilerin değerlendirilmesi kesit boyutuyla sınırlı kalmaktadır.

JEL Kodları: C80, C18, J01

Anahtar kelimeler: hanehalkı anketi, kurumsal olmayan nüfus, dönen örnek çerçevesi, kısa panel, cevapsızlık, kayıpranma, tersine kayıpranma, göz ardı edilememe, seçimlilik, ağırlıklandırma

1. Introduction

Household Labor Force Survey (HLFS) collected by the State data collection agency TurkStat is the data set used in compiling official labor market indicators (such as the LFPR, employment rate, unemployment rate, etc.), which are shared with international agencies. Since the survey was launched in cooperation with the ILO, definitions used in the designation of labor market states are the standard ones. After Turkey's candidate status for membership was accepted by the European Union (EU) in 2004, implementation has been carried out in close cooperation with Eurosotat, the Statistical Office of the EU, which monitors the national agencies that contribute to the EU Labour Force Survey (EU-LFS).[1]

Among those collected and maintained by TurkStat, HLFS has the longest history. Additionally, it is the most comprehensive data set for studying the labor market in Turkey.[2] The main aim of this article is to offer an unofficial guide to potential users, informed by my own experience as a user of micro-data from different sources. I dwell on some lesser known but important aspects of the data collection protocol, and their consequences, which are not covered (or adequately covered) in the official documentation.[3] I also point out difficulties that face researchers who want to use data from various incarnations of the HLFS together. A key message is that while the HLFS provides the opportunity to track changes in labor market behavior and outcomes over

[1] EU-LFS is conducted in all EU member states, four EU candidate countries including Turkey, and three European Free Trade Association (EFTA) countries. EU-LFS micro-database includes data for all member states, as well as data for Iceland, Norway, Switzerland, and the United Kingdom, but not Turkey.

[2] TurkStat conducts other surveys that include labor market information, but the emphasis is on other dimensions of the households' and individuals' experiences. These include the Household Budget Survey (HBS) and the Survey of Income and Living Conditions (SILC). HBS is a cross-Section survey that started in 2002. Although the objective is to collect detailed information on consumption and income, it includes a labor market module that mimics that in HLFS. SILC data have both cross-Section and 4-year panel components that allow capturing behavioral and outcome changes over time. The survey started in 2006 and is comparable to the EU version. It offers both self-assessed and official indicators of labor market activity, but the latter lack the precision with which employment and unemployment are measured in the HLFS. Newer rounds of the HLFS instrument also include questions on self-assessed labor market outcomes but results are not included in public-use files.

[3] The hazards of directing users to web page contents are well-known. Presently content pertinent to labor market analyses can be reached from TurkStat's main webpage (https://www.tuik.gov.tr/) by expanding the Statistics folder shown under the banner and picking the icon labelled Employment, Unemployment and Wages. The new page contains links that serve different functions. The Database link provides access to interfaces that allow users to extract up to three dimensional cross-tabulations of their choice from several data bases (including the HLFS). The link labelled Metadata contains the associated documentation on the data bases. Those relevant to the HLFS may found under Household Labour Force Statistics. The remaining links under Employment, Unemployment and Wages connect to relevant publications on the labor market, including Press Releases (formerly called bulletins) that contain summary reports issued at regular intervals, occasional one-time Reports and select Statistical Tables extracted from various data bases. Conveniently Metadata contents can also be reached from the links listed under the right-hand column of the press releases.

time, potential users need to be aware of simple issues such as breaks present in the series and subtle ones such as the focus on the non-institutional population.

The undertaking begins in Section 2 with a closer look at the implementation of the HLFS over time and discusses changes in coverage, sample frame, frequency, and implementation of the field work. Section 3 is devoted to the examination of unit non-response, the weighting approach used by TurkStat to render the data representative, and some potential shortcomings. The survey instrument, contents of the public use files, data dissemination policy and access constitute the subjects of Section 4. Section 5 reviews major breaks in the HLFS series as well as minor ones that emerge from coding and definition changes. Additional limitations and problems attributable to missing and hidden variables are taken up in Section 6. I devote special attention to two variables (monthly earnings and hours of work) which share the limelight in research on labor market outcomes and discuss the practical issues that face users of the HLFS. Some deeper statistical issues are taken up in Section 7. I discuss the implications of attrition (present in HLFS 2000 onwards) and the disconnect between the targeted and sampled population that can arise from exclusion of the institutional component of the population. Section 8 contains concluding remarks.

2. Overview of the HLFS, 1988-2022

HLFS was launched in October 1988 and was conducted biannually by the State Institute of Statistics (SIS) in April and October of every year through 1999.[4] This period overlapped with the initiation of the Labor Market Information project, a coordinated joint effort with UNICEF, and the World Bank Employment and Training project, implemented with the technical assistance of the ILO.[5] The survey went through major changes in 2000. Notably fieldwork was spread over all months of the year. The "New" HLFS shared the rotating sample frame utilized by many country implementations that contribute to the European Labor Force Survey (EU-LFS). This change facilitated tracking of labor market indicators at a quarterly frequency. Starting with 2005 the sampling frame was able to support the release of monthly indicators obtained as three-month moving averages centered on the middle month. In 2014 the HLFS went through another major revision. The rural/urban designation that guided the implementation until then was abandoned. The data collection effort was spread over 52 weeks of the year, and the survey came to be known as the "Continuous" HLFS.

[4] At the time HLFS was launched, the name of the data collection agency was Devlet İstatistik Enstitüsü (DİE) [State Institute of Statistics (SIS)]. It was changed to Türkiye İstatistik Kurumu (TÜİK) [Turkish Statistical Institute (TurkStat)] in 2005. I use the latter throughout except when referencing publications from the SIS period.

[5] Both projects were accompanied by a coordinated research effort led by late Prof. Dr. Tuncer Bulutay. Under his leadership both administrative data and HLFS microdata were used for pioneering analyses of the Turkish labor market. See the publications listed on pp. 12-14 in the *festschrift* published in his honor, Yıldırım (2015).

Target population: The HLFS targets the non-institutional component of the population residing within the national boundaries (often referred to as private households). Between 1988-2008 the size and basic demographic structure of the non-institutional component -- which is crucial for constructing the weights -- was obtained from regional projections based on the most recent population census. The current practice of using administrative records was adopted in 2009.

Individuals who reside in institutions, such as schools, dormitories, hotels, child and elderly care facilities, psychiatric hospitals, correction facilities, and accommodations that serve military personnel such as barracks and recreation facilities, and temporary settlements such as those used by seasonal agricultural workers are outside the target population. Although this is a common practice employed by data gathering agencies around the world, it may conceal individuals whose behavior is being studied. That HLFS yields an undercount of seasonal agricultural workers is an obvious case in point. As I argue in Section 5, there are less obvious consequences that emerge when studying youth outcomes.

Sample frame: HLFS has an address(dwelling)-based sample frame. To assure representation, the country is broken down into "blocks" that contain a fixed number of addresses.[6] Addresses that constitute the sample frame are determined in stages. TurkStat presently relies on a two-stage stratified sampling scheme. Geographical areas (regions) are the primary sampling units and serve as strata. In the first stage blocks to be sampled are selected from each stratum (region). In the second addresses to be visited are chosen. Addresses in chosen blocks are used as secondary sampling units. Addresses may contain businesses. Such encounters are recorded during the visit and invalid addresses (that do not contain households) are dropped.

Starting with 2000, HLFS data collection effort has employed a rotational sample frame present in similar surveys, such as the ELFS. Implementation hinges on starting with nationally representative subsamples which are scheduled for revisits according to a fixed schedule. The rotating sample frame (RSF) is chosen in advance and is updated periodically. The example included as Table A1 in the appendix depicts the rotation setup used between 2000-04.[7] Rotation schedule determines the timing of visit

[6] Currently each bloc contains approximately 100 addresses. In earlier years the blocs were formed using building enumeration lists obtained from individual municipalities. The practice was centralized and simplified after the Address Based Population Registration System [APBRS, later shortened to Address Registration System (ARS)] became available in 2009. The building list that TurkStat relies on in practice is currently known as the National Address Data Base (NADB) [Ulusal Adres Veri Tabanı (UAVT)]. It consists of addresses that contain at least one person according to the ARS (which is maintained by the Ministry of the Interior). In the paper I used the ARS designation rather than NADB. ARS is designated for replacement by a new version that contains geo-coded location identifiers, called Spatial Address Registration System (SARS).

[7] Note that the rotation schedule in Table A1 is different in early rounds. Steady state was reached in quarter 2 of year 2001. The updates in 2005 and 2009 introduced seams that resulted in truncation of scheduled visits on the tail end. Continuity has been maintained in later rounds.

sequences to addresses contained in a distinct subsample. At the steady state each address (subsample) is visited four times. The first two visits take place three months apart. After a six-month rest period (equivalent to two three-month breaks), the address is visited two more times. The last two visits are also separated by three months. This sequence, known as a 2-(2)-2 design, implies that the HLFS contains short panel components.

Each "round" of the HLFS consists of eight subsamples, paired in four groups. The cross-section component contains respondents from groups who are in various stages of the data collection effort. While two of the subsamples in each cross-section contain data from the group of fresh addresses contacted for the first time, two each contain data from addresses revisited a second, third and fourth time. The rotation schedule ensures that there is 50 percent overlap (approximately) between subsamples visited 3 and 12 months apart. By pooling data from several cross-sections of the HLFS (and the EU-LFS) it is technically possible to rely on the short panel components to track labor market dynamics at the quarterly and annual frequencies. In practice the short panels cannot be identified in the public use files.[8]

Until 2014 the sample frame of HLFS relied on another layer of stratification, with the rural/urban distinction as the focal point. The distinction was based on the population of the locality. Locations with 20 thousand inhabitants or less were designated as rural areas. Since a large fraction of the population resided in rural areas in the 80s and 90s and depended on agriculture for its livelihood, TurkStat was careful to oversample them to assure representativeness. Although the population-based location distinction survived through 2013, its adequacy in capturing the differences in labor market opportunities eroded over time. In the more developed parts of the country, locations designated as "rural" by virtue of their population size shared more features with "urban" areas that they bordered, than distant rural areas where agricultural activities continued to predominate (see İlkkaracan and Tunalı, 2010). Changes in the laws that determine the structure and jurisdiction of municipalities in 2013, namely redesignation of villages within the borders of Greater City Municipalities [Büyük Şehir Belediyesi] as districts, resulted in breaks that rendered the rural/urban classification useless. Presently TurkStat relies on an administrative distinction to assure representativeness of its sample frame but does not include a marker that facilitates that distinction (see the discussion on weights in Section 3).[9]

[8] On rare occasions this component has been obtained by special permission from TurkStat -- see Tansel and Taşçı (2003, 2010), Taşçı and Tansel (2005), Tunalı (2009a, b). Last two papers shed light on the short panel structure of the data and document attrition patterns. Papps (2011) used matching on a list of observables to create panels for his dynamic analysis. Inferences drawn from balanced panels created by matching are only correct when attrition is random (Peracchi and Welch, 1995), a questionable assumption given the evidence in Tunalı (2009a, b).

[9] According to the population-based definition, 72 percent of Turkey's inhabitants resided in urban areas while 28 percent resided in rural areas as of March 2014. When the calculation was repeated using the

Survey frequency and intended sample size: The HLFS was first conducted in October 1988 and repeated bi-annually between 1989-1999. The fourth week in April and October served as reference weeks for collecting information on labor market activity. Survey frequency increased with the launch of the "New" HLFS in 2000. Between 2000-3 the reference week was the last week of each month. In 2004 it was moved to the first week that starts on a Monday. Starting with 2014 the survey was fielded every week, and the full week before was designated as the reference week. The qualifier "Continuous" HLFS reflects the fact that every week of the year – including those that contain national holidays -- serves as the reference week. Clearly the continuous version of the HLFS has the best chance in reflecting the changes in the labor market. Some unintentional practical implications of the switch are discussed in Section 5.

As seen in Table 1 intended sample sizes were adjusted upwards over time to capture the diversity of the expanding population and to support increased frequency of indicator estimation. Actual sample size is determined in the field, after dropping addresses that do not contain households and those who refuse to participate (see Section 3 on non-response). In 2021 TurkStat adjusted its sample frame to accommodate the compilation of monthly indicators for single months (see TÜİK, 2021b). This bold effort was made possible by an expansion of the intended sample size. The excess volatility in sectoral employment levels, underscored in research briefs prepared by the Bahçeşehir University Center for Economic and Social Research (Betam), suggest that further increases of the sample size are warranted.[10]

new administrative borders of municipalities (drawn by amendments to Laws 5393, 6360 and 6447 in 2013) the national breakdown was 86 percent urban. In the 30 provinces that included Greater City Municipalities the breakdown was even more lopsided. Rural share based on the 20 thousand population threshold declined from 21 to 3 percent. The figures are from the TurkStat web page, https://www.resmiistatistik.gov.tr/detail/subject/kir-kent-taniminin-revizyonu/ (in Turkish). TurkStat recently developed a three-way designation ("densely populated, intermediate-density and thinly populated" areas) based on the Degree of Urbanisation (DEGURBA) approach initiated by the Eurostat: https://data.tuik.gov.tr/Bulten/Index?p=Urban-Rural-Population-Statistics-2022-49755. The new designation is yet to be put into practice.

[10] The volatility was underscored in various issues of the Monthly Labor Market Outlook published by BETAM throughout 2021. TurkStat stopped publishing monthly sectoral employment data after December 2021.

Table 1. Intended HLFS sample sizes

Years	Number of households
1988-93	11,160 per round
1994-99	13,000 per round
2000-03	23,000 per quarter
2004-13	13,000 per month (39,000 per quarter)
2014-20	3,444 per week (44,000 per quarter)
2021 onwards	5,400 per week (58,500 per quarter)

Source: Miscellaneous SIS and TurkStat documents.

Fieldwork: The early HLFSs were conducted face-to-face using paper questionnaires. Starting in 1995 TurkStat transitioned to Computer Assisted Personal Interviewing (CAPI). In response to the onset of the pandemic Computer Assisted Telephone Interviewing (CATI) was introduced in 2020. Presently the fieldwork is being implemented under the supervision of 26 regional offices (that correspond to NUTS2 designation) using both CAPI and CATI. CAPI is used during the first visit to the household. Later visits are implemented by CATI when resources are available. The number of households contacted are around 5400 per week, 58,500 per quarter, and 234 thousand households per year. The annual sample size is approximately 760 thousand individuals of whom 580 thousand are aged 15 or above (TÜİK, 2022).[11]

Proxy use: The survey instrument of the HLFS is designed to collect many details about individual labor market outcomes. Since visits take place during working hours, employed members of the household are often not present. EU-LFS protocol allows answers by a member aged 18 or older, who is recorded as the proxy respondent (Eurostat, 2016). TurkStat policy is to refrain from using proxy responses when the individual is in the labor force. Although staff from TurkStat regional offices try to contact the households by phone to reduce proxy responses and correct them as needed,

[11] Given the scope of the undertaking and the pressure to report results in timely manner, the fieldwork is extremely demanding. According to TurkStat (2021a), 270 interviewers and 50 controllers are involved every month. Regional offices use a control-edit system aimed at catching problems as early as possible.

some fraction remains in the database. According to the most recent EU-LFS quality report (Eurostat, 2022), the share of proxy responses in HLFS was 12.1 percent in 2020. The EU average for 34 countries was 34 percent. Only five countries had a share under 10 percent. In earlier years for which data are available (2016-19) the share of proxy responses in HLFS varied between a low of 9.6 percent and a high of 11.6 percent. Proxy responses are not identifiable from the information included in public-use micro data files.

Regular publications: Since HLFS is the data source for compiling the official labor market indicators (estimates), press releases (also known as news bulletins) precede micro-data dissemination. Between 2000-4 quarterly and annual indicators were disseminated. Starting with 2005 monthly estimates in the form of 3-month moving averages centered at the middle month were added. In 2021 TurkStat started publishing monthly indicators from individual months. Current versions of the press releases -- titled "Labor Force Statistics" -- are issued at monthly, quarterly, and annual frequencies and are accessible from the web page of TurkStat. These contain a summary account of the developments and useful links to documentation on methodology, definitions of the indicators and changes in implementation practices.

Going back in time, detailed tabulations from the original HLFS were published in the form of biannual volumes and could be found in many university libraries. This practice continued for a while after the switch to the "New" HLFS via the publication of annual volumes. Online versions of later volumes are also available.[12] They are accompanied by helpful documentation and copies of the questionnaires used in the field in earlier versions. Newer versions contain a guide to the contents of the micro-data files available to the public.

[12] On occasion TurkStat updates the weights used in obtaining the national estimates to make best use of available projections. As a result, contents of printed volumes and pdf versions maintained on the web page become dated.

3. Non-response and weighting

Non-response is unavoidable in survey research. The survey literature distinguishes between two types, unit non-response which occurs when no data can be collected from the unit to be surveyed, and item non-response, which occurs when some components of the data are missing. Starting with the first, and adopting the typology found in methodological documents and quality reports of the EU-LFS, the reasons can be classified as: (a) encountering the 'wrong unit' (for example, a business rather than a household, a building site, or a dwelling used occasionally) at the address, (b) inability to contact the household members in a given round, (c) refusal of participation in the survey by the household, and (d) other reasons, which refer to technical mishaps such as lost interview records, or expiration of allotted time for completing an interrupted interview.

Technically non-response of type (a) only reduces the sample size and does not have deeper statistical implications.[13] If (a) occurs during the initial visit, the nature of the 'wrong unit' is recorded but the address is kept in the sample frame and revisited, in case it gets occupied by a household later. When (b) occurs, the same protocol is followed. The most frequently encountered reason given for type (b) non-response is "the household no longer resides at this address." If a different household is found at a given address in a later visit, it too is interviewed, on the grounds that the sample frame is address-based.[14]

Although the same non-response protocol is followed, TurkStat carefully distinguishes between non-response type (a), which is attributable to encountering a unit outside the scope of the survey, and (b), which underscores a missed opportunity to interview a proper unit targeted by the survey. While most household surveys (including many under the EU-LFS umbrella) are inundated by type (c) non-response, TurkStat staff indicate that it has been uncommon in the HLFS (except under extenuating circumstances such as the pandemic, or severe economic crises such as the 2001-2002 episode).

Based on the information given in eight recent press releases casually selected for inspection, I found response rates as low as 81.1 percent (January 2020) and as high 86.7 percent (4th quarter of 2021). [15] The bulk of the non-response is of type (a). Based

[13] In the early years of the HLFS when address lists were far from being accurate, substitution by a nearby unit was employed in case of type (a) non-response. SIS ended this questionable practice in 1994 and started recording the reason for non-response on a separate form. The revised practice continued after cooperation with Eurostat began.

[14] The current TurkStat practice is to retain the household identifier on the grounds that it marks the address, and not the household. If and when the short panel dimension of the HLFS becomes available, users have to exercise extra care in distinguishing the old households that drop from the panel, from the new ones that enter it.

[15] Based on the most recent HLFS bulletins I have examined, TurkStat appears to have halted the inclusion of household level non-response statistics sometime in 2022.

on the statistics reported in Eurostat (2022, Table 4.5) the incidence of unit non-response in HLFS, conditional on having a household at the address, is among the lowest encountered in EU-LFS implementations. The figure was 5.5 percent in 2020 and ranged between 4.3-5.3 percent over 2016-19. Breakdown by types (b)-(d) given in Table 4.6 corroborates the staff view that refusals are very rare.[16]

In data collection efforts that employ a RSF, non-response at the initial visit vs. at subsequent visits have different implications. These will be taken up in Section 7 when I address the attrition consequences of RSFs. The weighting scheme employed by EU-LFS and TurkStat ignores the overlap between subsamples which are at different stages of the rotation schedule and views each cross-section as an independent random sample drawn from the target population.[17]

Non-institutional population projections based on the Address Registration System (ARS) data are updated annually and midpoint estimates consistent with survey frequency are used to calculate the weights. Weights are based on a low dimensional vector of observables: gender, age group, household size, region, and administrative division. The objective is to ensure that the weighted sample has the same "structure" as the target population when broken down by the listed observables. When data collected at different frequency overlap, question of consistency among the indicators calculated at the different frequencies (namely monthly and quarterly) arises. To achieve consistency the weights are "calibrated" following EU guidelines (TurkStat, 2022).

Weight calculation is a very important step in making data collected in the field representative. Yet it is preceded by the need to have an accurate estimate of the target population. Prior to the availability of the ARS, projections of the non-institutional population were based on data from recent General Population Censuses (GNS). As new GNS data became available, projections were revised. Each revision resulted in updating of weights for several rounds of the HLFS. When data from TurkStat web page are extracted using the dynamic data compilers (see Data Access in Section 4), users see a warning message which indicates that levels in HLFS data collected prior to 2004 are not compatible with those in later rounds. This is attributable to the fact that the weights for HLFS 1988-2003 are based on projections that use the 2000 GNS, while weights for HLFS 2004 and later data rely on projections compatible with the ARS. Some key implications of this are taken up in Section 5, where I identify the breaks in the series.

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[16] This may be attributable to the law that obliges participation in official surveys. Prior to the visit TurkStat sends a letter that explains the objectives of the survey to all addresses chosen for inclusion in the sample-frame. The letter assures that the information collected by the agency will not be used in a manner that can be detrimental to the household and underscores that participation is a citizenship responsibility.

[17] This is the standard approach of agencies engaged in data collection. Although sample weights serve an important function by aligning the sample with the target population, their proper use is debated in the research community. See Solon et al. (2015).

To repeat what I wrote upfront, non-response is unavoidable in surveys. Data collection agencies deal with non-response that occurs in the field by making further adjustments to the weights computed in their headquarters. In essence the mechanics of weighting when non-response is present, is not any different from that which would be used in the absence of non-response. As I argue in Section 7 under the attrition sub-heading, this method of weighting may result in defective data when a RSF is used.

Item non-response, which refers to missing answers to specific questions, is another threat to data quality. It appears to be rare in HLFS, in part because the staff in TurkStat regional offices make every effort to rectify problems by contacting the respondents. Admission of proxy responses is known to trigger item non-response. Statistical agencies often use imputation to improve the apparent quality of the data they collect and disseminate. Pros and cons of imputation are discussed in Peracchi (2002).[18]

Public use micro-data from HLFS 2020 onwards includes a question about the response status of individual household members. These individuals are retained in the data set so that household composition is correctly reflected. In the file that describes micro-data contents users are warned that some responses may be missing and reminded that the weights that accompany such observations have been set to zero. By using the latter information, I found only 89 observations with zero weights among 635 thousand and 159 observations in HLFS 2021. To my knowledge there has been no systematic analysis of these and other data quality issues in the context of the HLFS, save the quality reports I mentioned above.

4. Micro-data contents and access

In this Section I take a brief look at the contents of the survey instrument and public use files, highlight the data dissemination policy of TurkStat, and point out ways to access HLFS data. The design of the original HLFS survey instrument reflects ILO's concerns with informality and unemployment. The cooperation with Eurostat that started in the early 2000s brought the implementation of HLFS closer to the European LFS. Yet the influence of the early emphasis can still be seen. The questionnaires and micro-data content underwent changes over time. Nonetheless it is possible to trace labor market outcomes over time, starting with the October round of the 1988 survey. At the time of writing this article public-use files of micro-data from HLFS 1988-1999 were not readily available and could only be obtained with special permission. Conveniently extracts that contain a small set of variables necessary for pooled cross-section analysis (such as the

[18] Peracchi (2000, p.87) includes the following quote from Dempster and Rubin (1983), two prolific statisticians who have contributed to research on missing data: "[T]he idea of imputation is both seductive and dangerous. It is seductive because it can lull the user into the pleasurable state of believing that the data are complete after all and is dangerous because it lumps together situations where the problem is sufficiently minor that it can legitimately be handled in this way and situations where standard estimators applied to real and imputed data have substantial bias."

Tunalı et al. (2021) study) can be obtained by contacting TurkStat (see data access below).

Micro-data are accompanied by a file (Structure of the HLFS Database ["Hanehalkı İşgücü Anketi Veri Seti Yapısı"]) that lists the variables included in the public use files, the associated question, skipping and branching rules, and the coding of the answers. Without doubt questionnaires would be more helpful, but availability is patchy after 2005. A copy of the 2016 questionnaire downloaded from the EU-LFS web page is included in the appendix.[19]

Fieldwork by interviewers is supported by detailed instructions given in the "Interviewer guide/handbook." The handbook is an extremely helpful resource for researchers interested in the nitty-gritty of data collection, namely how variable contents are formed. This information is extremely valuable for linking the practice with concepts that guide empirical work. For some undisclosed reason TurkStat dropped the policy of sharing the handbook after the switch to the continuous HLFS. Diligent researchers are likely to encounter bootlegged copies of the handbook on the internet.

Data access: Public use files of the "New" HLFS that contain micro-data are presently available at annual and quarterly frequencies (henceforth QHLFS). The annual version can be obtained in digital format from TurkStat. The QHLFS can only be accessed at data centers ("Veri Araştırma Merkezi") located in regional offices of TurkStat, in Ankara, Istanbul, and Izmir. Micro-data from the biannual HLFS are also available but may be difficult to obtain. Experienced users familiar with micro-data sets available elsewhere – especially those for developed countries -- will discover that procedures for gaining access are somewhat more onerous, but both the quality of the data (measured by internal consistency) and the support provided by TurkStat staff make the effort worthwhile.

TurkStat web page features dynamic data compilers that allow extraction of time series on main indicators that can be broken down by 2- or 3-way conditioning variables such as region and demographic markers (gender, age, education). These can be extremely useful for assembling background information and observing trends (examples will be given below in Section 5). Requests for micro-data sets as well as special data requests (such as extracts from multiple rounds of the HLFS) can be directed to the Data Dissemination and Communication Department/Official Statistics Planning and Monitoring Group, which can be reached at info@tuik.gov.tr.

Starting with 2005, the implementation of the HLFS has been coordinated with Eurostat. This paved the way for alignment of data collection procedures and data content with the European LFS. As a byproduct of this collaboration, TurkStat joined

[19] Interestingly this questionnaire does not have the demographic module. The missing module contains helpful questions on migration history and records information about the respondent's relation to the head (reference person) which allows the construction of the valuable relationship matrix.

several special data collection efforts of the EU-LFS. The modules collected in this fashion are shown in Table 2.[20] Also worthy of mention are the modules (appended to HLFS 1994, 1999, 2006, 2012, 2019) directed to child labor, in collaboration with UNICEF and the ILO. Press releases about special modules contain useful information about the contents.

Table 2. Special modules of the HLFS conducted in coordination with the EU-LFS

Year	Module name	
	European LFS	HLFS Turkey
2007	Work related accidents, health problems and hazardous exposure	İş Kazaları ve İşe Bağlı Meslek Hastalıkları
2009	Entry of young people into the labour market	Gençlerin İşgücü Piyasasına Geçişi
2011	Employment of disabled people	Engelli Fertlerin İstihdamı
2013	Accidents at work and other work-related health problems	İş Kazaları ve İşe Bağlı Meslek Hastalıkları
2016	Young people on the labour market	Gençlerin İşgücü Piyasasına Geçişi
2017	Self-employment	Kendi Hesabına İstihdam
2018	Reconciliation between work and family life	İş ve Aile Yaşamının Uyumu
2019	Work organisation and working time arrangements	İş Organizasyonu ve Çalışma Zamanı Düzenlemeleri

Source: EU-LFS web page and private communication with TurkStat staff.

[20] Information about upcoming EU-LFS modules may be found on the Eurostat web page (current link https://ec.europa.eu/eurostat/statistics-explained/index.php?title=EU_labour_force_survey_-_modules&oldid=543984#Overview_of_the_modules)

Although TurkStat shares HLFS data with them, micro-data files are presently not available on the Eurostat/EU-LFS web page.[21] However select tabulations from micro-data that permit comparison with member and non-member countries in Europe can be retrieved. TurkStat also shares data with international organizations such as the ILO, OECD and the World Bank, which permits extraction of helpful tabulations for comparison from the databases they maintain.

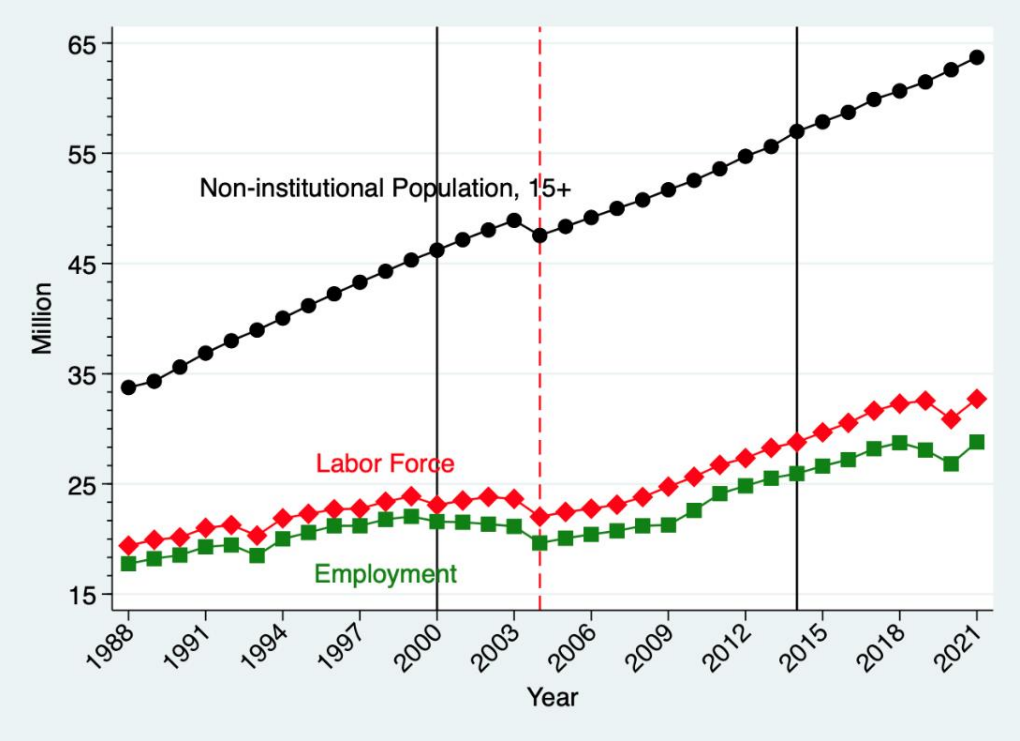
5. Breaks in the series

Breaks in series obtained from data collection efforts that spread over a long period are inevitable. It is helpful to classify the breaks as those due to changes in the sample frame, and those attributable to definition and coding changes. The former can be broken down further as breaks resulting from revisions in the data collection frequency, and breaks resulting from methods used in obtaining the population projections.

Major revisions of the HLFS: The change from the original (biannual) HLFS to the "New" HLFS in 2000, and from the "New" to the "Continuous" HLFS in 2014 were accompanied by major changes in the sample frame which were the subject of Section 2. One would think that the labor market picture that emerges from a single reference week of April or October would be different from the one obtained from 12 reference weeks, distributed throughout the year, and that in turn might be different from the version obtained from 52 reference weeks. Leaving the possibly informative differences aside, it would be logical to expect the ability of the survey to track the changes in the labor market improved with each change.

[21] The EU Labour Force Survey (EU-LFS) is conducted in all EU member states, 4 EU candidate countries including Turkey, and 3 European Free Trade Association (EFTA) countries. EU-LFS micro-database currently includes data for all member states, as well as data for Iceland, Norway, Switzerland, and the United Kingdom.

Figure 1. Non-institutional population (15+), labor force and employment levels



Source: Own calculations on data retrieved from the Labor Force Statistics database, TurkStat.

We begin by examining the effect of the changes via Figure 1, which tracks the aggregates used in arriving at key labor market indicators such as the labor force participation rate, employment to population ratio, and the unemployment rate. Solid vertical lines in this picture mark the breaks due to the major changes that took place with the switch to the "New" and later the "Continuous" HLFS. That the non-institutional population series is not affected by the changes brought about by the "New" HLFS is not surprising, because this series is generated by population projections, rather than data collected from the field. The other two series, labor force and employment levels, show small downward adjustments in 2000. Given that April and October are months where seasonal effects are not strong, and that participation and employment typically peak in summer months, the downward movement in employment is surprising.[22]

[22] İlkkaracan and Tunalı (2010) point out the dramatic reduction of 1 million workers between 1999 and 2000 (a drop of more than 20 percent) and attribute it to the break induced by the switch from the old to the "New" HLFS. As we went over her comments on my paper, Meltem Dayıoğlu and I debated the nature of the break and came up with another potential explanation, namely the change in the classification of

The break in the series initiated by major changes in the sample frame that became effective in 2014 (see Section 2) seems to have had little impact on the aggregates. On the other hand, the revision of the "New" HLFS series using the "new" weights based on the ARS created a substantial break in levels in 2004 (dashed line). Note that the actual break in the series took place in 2009, when TurkStat started using APBRS based projections. To assess the impact of using the new (and presumably more accurate) population level and structure, TurkStat revised the non-institutional population projections backwards, and then computed new sampling weights for the HLFS. These revisions moved the break back to 2004, the final year for which TurkStat computed revised non-institutional population projections and weights consistent with the ARS.

The key take from this discussion is that breaks generated by changes in population projections may have huge consequences for "levels" tracked by HLFS data. Since actual behavior is captured by the data collected in the field and the data-based aggregates are affected in similar fashion by the adjustments to the weights, the series for the key indicators calculated as ratios do not contain breaks. More importantly the breaks are not likely to create problems for micro-data users who investigate changes in individual behavior.

Some other features of the series in Figure 1 deserve attention. The first is the dip in employment and participation rates in 1993, which was not a crisis year. Put differently, it was not an economic crisis that resulted in the dip. Closer scrutiny of the data reveals that the dip is a rural phenomenon that took place in the southeastern region. It is attributable to the difficulties of carrying out the fieldwork for HLFS at a time when the government was trying to deal with a major uprising in the Kurdish dominated provinces. The second is the ability of the aggregates to reflect the effect of shocks associated with the 2009 global crisis and Covid-19.[23]

It is worth pointing out that the absence of visual evidence in Figure 1 does not mean that the switch to the "Continuous" HLFS, which was accompanied by a change in the sample frame has not had an impact. The visual method of detecting breaks is employed in Demirci and Poyraz (2021) to show the effect of the change in sample frame

employment statuses of members of farming households. Given the difficulty of separating consumption-oriented and market-oriented production, the initial practice was to code the head of the farming household (typically a male) as self-employed, and all other working age members as unpaid family workers. At some point in time this practice was replaced by one that used a tougher standard -- that sought evidence of productive involvement in the farm during the reference week -- for classifying the member as employed. Since agricultural work is concentrated in certain months with long periods of inactivity in between, the early practice is likely to have yielded an elevated measure of the share of employment in agriculture. Given the large drop in the level of unpaid family workers between 1999 and 2000 reported in İlkkaracan and Tunalı (2010) and elsewhere, we think the change in practice may have accompanied the switch to the "New" HLFS in 2000.

[23] The effect of the 2009 crisis is muted in Figure 1 but becomes evident when the unemployment rate is brought under focus.

in 2014 at lower levels of aggregation. They show that the revision significantly affected the population of individuals aged 65 and above, and the population in Istanbul (NUTS2 = 1).[24] As I argued, population numbers come from the ARS, and are external to the data collection effort. Data collected from the field are adjusted to match the structure of the non-institutional population by employing weights (subject of Section 3). It surely would be accurate to say that continuous sampling, based on a sliding reference week concept that covers every week of the year, plus the change in the sample frame produced a better, more representative annual sample.

Region definition: Early HLFS 1988-99 did not have a sample frame suitable for producing regional estimates. The urban-rural distinction was present until 2013, although it ceased to be a useful marker by the end of the first decade of 2000. HLFS 2000-03 offered representation for seven regions and nine provinces (Adana, Ankara, Antalya, Bursa, Erzurum, Gaziantep, İstanbul, İzmir, Samsun). The regions were demarcated by geography rather than economic concerns. The NUTS (the French acronym for Nomenclature of Territorial Units for Statistics) classification, which is a hierarchical system for dividing up national territory from an economics perspective, was adopted in 2004. NUTS hierarchy used in Turkey identifies 12 regions at NUTS1 level, and 26 subregions at NUTS2 level. Individual provinces serve as NUTS3 designations. Relevant TurkStat publications and micro-data documentation contain warnings to users about the geographical dimensions that offer representation. Since the sample frame of HLFS does not support representation at NUTS3 level, this information is not available in micro-data files.

Employment and unemployment definition: From the very beginning TurkStat adhered to ILO guidelines for the purposes of producing statistical indicators of labor market status. These guidelines are determined by consensus at the International Conference of Labor Statisticians (ICLS) which meets at unequal intervals. Starting with the early 2000s harmonization with EU-LFS became the primary objective. Nonetheless TurkStat seems to have parted way with Eurostat in 2011 when it quietly implemented a controversial Government decision and started classifying women who collect social assistance for taking care of elderly relatives and disabled off-springs, as employed. Uysal and Kavuncu (2019) tried to estimate the impact of this unusual policy on employment using micro data from the HLFS and arrived at a figure of about 350 thousand in 2017.[25] In 2021 TurkStat adopted the mandate of the 19th ICLS and stopped

[24] Demirci and Poyraz (2021) refer to the target as "civilian" population, rather than non-institutional population. Their terminology does not capture the exclusion of students who live in dorms, which has significant implications for research that focuses on the youth.

[25] Based on the input I obtained from TurkStat experts, I estimated the number of care givers at home from the interSection of (i) women, (ii) classified as wage and salary earners, whose (iii) economic activity code (NACE) equals 88 (social work activities without accommodation for the elderly and disabled), and (iv) workplace designation is listed as "other" (or missing). I arrived at smaller numbers than those given in Uysal and Kavuncu (2019). According to my own calculations using weighted micro data the numbers

classifying individuals who cultivated goods for subsistence as employed. Given the dominance of market-oriented cultivation, this recent change had a small impact on employment.[26]

Changes in data collection frequency were accompanied by adjustments in the search window used in the definition of unemployment. In the biannual HLFS, individuals who actively searched for jobs within the past six months passed this test. The switch to the "New" HLFS, which initially aimed quarterly data production, was accompanied by the shortening of the period for tracking search activity to three months. The 3-month moving average unemployment estimates that TurkStat published as "monthly" indicators starting with 2005, were initially calculated using the same time window.[27] TurkStat reduced the search window to one month in 2014.

Education: HLFS records the completed level of schooling and current enrollment status of individuals. Since individuals residing in dorms are outside the sample frame, data for sampled individuals in the 15-24 interval may be unrepresentative. I will elaborate on this point in Section 6. Presently I want to alert the users to an unintended and understudied consequence of the 1997 Compulsory Education Reform, which increased the duration of primary school education from 5 to 8 years.

Before the reform TurkStat coded educational attainment in 7 groups: (i) illiterate, (ii) literate without a diploma, (iii) primary school (5 years), (iv) middle school (8 years), (v) high school, (vi) vocational high school, and (vii) university. After the reform, a new category, (viii) extended primary school (8 years, "ilköğretim" in Turkish) was added to the list. The second reform broke the schooling period into three equal components, dubbed 4+4+4. This brought back the primary school diploma, which could be earned in 4 years (rather than 5 previously).

Figure 2 tracks the educational attainment of 15-19 year-olds as recorded in the HLFS. For simplicity I combined levels (iv) and (viii) as middle school and levels (v)

(share in female wage and salary employment) increased from about 37 thousand in 2011 (0.25 percent) to about 337 thousand in 2018 (1.7 percent).

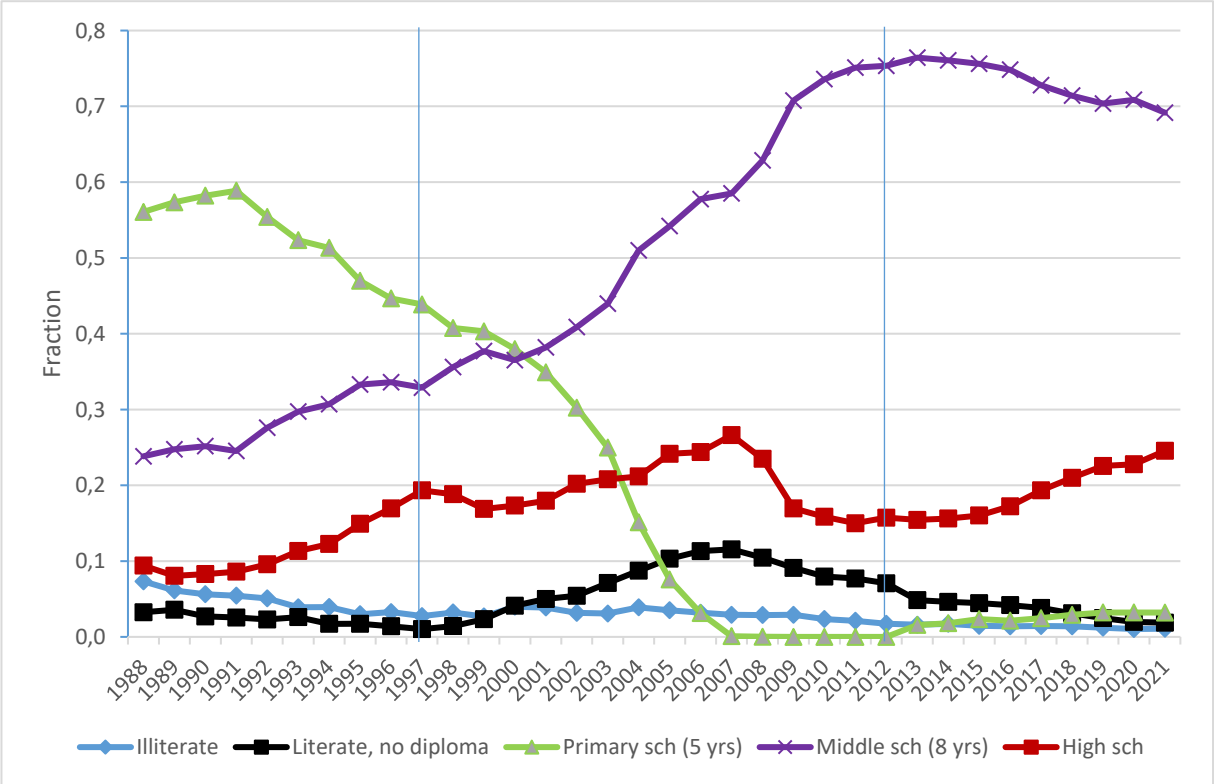
[26] To be precise prior to the change in 2021 members of farming households who engaged in self-cultivation for the sole purpose of consumption were classified as *employed* 'as long as the value of goods produced covered 50 percent or more of its food consumption.' The 19th ICLS recommended that 'members of households who do not market their products' should not be classified as *employed* on the grounds that this practice could conceal unemployment. According to TurkStat (2021), the change in definition reduced employment by about 60 and 200 thousand respectively, in the first and second halves of 2020. These respectively amount to about 0.23 and 0.73 percent of total employment at the time (own calculations). Keeping in mind that 2020 was the year marked by Covid-19, the employment figures are from an abnormal year. An earlier change in the classification of the employment status of members of farming households is the subject of fn. 22.

[27] According to my calculations, the switch from the 3-month to the 4-week window would have resulted in about 1 percentage point decrease in the unemployment rate. The difference is higher (lower) when the unemployment rate is higher (lower).

and (vi) as high school. Vertical lines mark major reforms. The graph reveals that the share of those identified as “literate, no diploma” increased following the 1997 reform. It exceeded 10 percent between 2005-2008 and did not return to pre-1997 reform levels until 2021. The mechanism is straightforward. Since the reform prolonged the duration needed for earning the first diploma, students who would have dropped out of the school system after earning a 5-yr primary school diploma, ended up in group (ii), the literate without a diploma category.

This situation continued until 2012 when a new reform extended mandatory education to twelve years (and broke it down into equal segments as 4 + 4 + 4) but did not enforce it as vigorously as was the case with the earlier reform. Although it is tempting to view the re-emergence of observations in the primary school attainment category in 2013 in Figure 2 as corroboration of lack of enforcement, micro-data have a different story to tell.

Figure 2. Educational attainment of the non-institutional population, ages 15-19



Source: Own calculations on data retrieved from the Labor Force Statistics database, TurkStat.

As micro-data users who examine educational attainment are bound to find out, individuals who completed the defunct primary school started showing up in the data

before the 2012 reform. This oddity is attributable to the need to produce proof of a minimum of primary school education or equivalent in driver's license applications. The Ministry of Education solved the problem by awarding individuals who attained 4-5 years of schooling an equivalency document that allowed them to get their licenses.[28]

I will make further use of Figure 2 in Section 6. Presently the most significant aspect of the graph is the unintended consequence of the 1997 Compulsory Education Reform, which increased the duration of primary school education from 5 to 8 years. Based on the evidence, the 1997 reform may go down in history as the only education reform that hurt a small, but significant share of children, by placing them in the 'dropout' category. Although many papers have been written to document the favorable outcomes and spillovers of the reform, this negative effect, which undoubtedly was concentrated among the least privileged, is yet to be studied.

6. Missing and hidden variables

That all, or some components of the data may be hidden from the researcher because of "unit" non-response, was mentioned earlier, in Section 3. That Section is about non-response that arises from the inability of the interviewer to collect data. Other forms of non-response, termed "item" non-response, may emerge because of the very nature of the data being collected. An example of this is the incidence of zero monthly earnings, which will be addressed under a separate heading towards the end of this Section. Furthermore, some portions of the data may not be available to users because of deliberate action by the data collection agency. Several examples of hidden variables were given earlier; others are discussed in this Section.

Why the agency hides some of the data it collects and includes others with a warning such as "statistics may be uninformative or biased because of small cells," is often difficult to understand. Answers are typically hidden when the sample size does not allow drawing proper statistical inferences (within the error margins adopted by the statistical agency) or when the sampling frame does not support representation for the groups demarcated by a variable. A good example of the latter is exclusion of NUTS3 information. Since the sample frame/size is inadequate for calculating unemployment rates (say) at province level, this information is not shared with users. In similar fashion even though TurkStat knows the month and week of the visit, it is not in the database. The downside is controls that could be used to keep track of location and calendar effects are unavailable. Some of these may be justifiable by reference to common practices of statistical agencies. Whatever the reason, some components of a very rich data set collected at great expense are never used.

[28] Since participation in HLFS does not require citizenship, some of those who marked primary school attainment could be non-natives who completed their schooling before arriving in Turkey.

Similar concerns have led to aggregation of the answers to fewer categories than available choices. A good example of this is coding of education. Although questionnaires may contain separate entries for 2–3-year associate degrees, 4-year university degrees, 5-6 year university degrees (such as those awarded to medical school graduates, masters degrees and doctorate degrees, all are typically lumped together under "university." Another example is the disappearance of casual worker status, which is lumped with wage and salary earners. The change came after the addition of the question about the permanency of employment. This is an important question, because labor law recognizes formal employment that lasts longer than six months as a permanent bond and imposes obligations on the employer. Arguably casual work and non-permanent employment are not the same. For example, jobs with fixed-duration contracts are non-permanent by design. Yet they are not casual jobs, which typically last shorter. In the absence of access to the handbook it is not known how the distinction is handled in the field.

It is worth mentioning that some changes in practice are driven by developments outside TurkStat's jurisdiction. For example, occupation (ISCO) and economic activity (ISIC then NACE) codes are adjusted over time to reflect changes in the labor market. The revisions can create breaks, but the effects can often be circumvented by aggregating to a lower dimensional vector. Sometimes aggregation may result in loss of potentially relevant detail. A good example of this is the firm size variable which has been reported using 4 to 6 categories during the 2004-18 period. The classification used in 2004 was expanded in 2005, changed in 2014, and again in 2015. This limits the only possible consistent breakdown over the full period to a binary one: those with under 50 workers, and those with 50 or more.[29]

Although information on children (under 15) and the so-called relationship matrix are collected, they were excluded from the public use files for HLFS 2014-20. This exclusion emerged as a handicap from the vantage point of research that hinges on knowledge of household composition. To name one, it stands in the way of studying changes in labor supply behavior of married women. In the absence of affordable child-care, age and sex composition of children act as key constraints that need to be taken into consideration. Thankfully the missing component can be obtained from TurkStat and linked to the adult (15+) data set. Thankfully the full demographic module has been included starting with HLFS 2021.

Monthly earnings: The single income question in the HLFS instrument asks the respondent to report total net (after tax) nominal earnings in the previous month from

[29] In many micro econometric applications, it is desirable to use firm size as a control variable. In such cases a better alternative would be to create mutually exclusive and exhaustive dummy variables. I'd be happy to share a STATA do-file which achieves this with interested users.

the main job, including the share of periodic bonuses.[30] Earnings is an important outcome variable which is crucial for tracking changes in the labor market.[31] A practical matter which is known by micro-data users is that some individuals who were classified as employed by virtue of having worked during the reference week, may report zero earnings.

Although continuous implementation ushered in better coverage of changes in labor market status, it may have influenced the data generating process of the monthly earnings distribution. If those who fail to report positive earnings constitute a random subsample of the sampled individuals, the monthly earnings distribution will still be unbiased (barring other problems). Yet this is often not the case. In fact, a kitchen-sink regression of incidence of observing positive earnings, on observables used for differentiating human capital and job characteristics, produces a statistically significant association. This suggests that monthly earning distributions, and consequently results of regressions based on the subsample of positive earners, may not be comparable over time.[32]

According to aggregate quarterly HLFS data supplied by TurkStat experts, during 2014-19 the share of individuals who started a new job varied between 8.3 and 11.8 percent of total employment in that quarter (average 9.4 percent). Since some of those who started work in the survey quarter have been employed long enough to report positive monthly income, the share of those who report "zero" as their monthly income is lower in micro-data files. On the other hand, some of those who report zero earnings have held their current job for more than a year. In this case the zeroes should be treated as item non-response. Incidence of zero (or missing earnings) increases in the "Continuous" HLFS, which allows every week of the year to serve as a reference week (Öztürk and Tunalı, 2021).

Scrutiny of the HLFS survey instruments included in the Appendix allows us to identify information collected but not included in the public use micro-data files. This hidden information set includes responses to two questions which can help resolve the concerns I have underscored about the presence of records with zero earnings. Responses to question 41b in the Employment Section about "month" in which the current job began -- directed to those whose employment spell started within the last two

[30] Although the question is asked to all gainfully employed individuals, TurkStat only includes the responses of wage and salary earners in its public use files. This is the common practice of many data collection agencies. Collecting income information from employees is hard enough, and TurkStat has other surveys (HBS, SILC) that aim to document different income sources.

[31] Reliable monthly earnings information is available starting with HLFS 2004. Data collected in 2002-2003 also contain earnings but these are reputed not have gone through proper edit-control checks. Biannual HLFS data 1988-89 contain monthly as well as annual earnings information.

[32] The issue is reminiscent of the familiar concern that arises from selective participation of women. An important lesson from the body of work on women's employment outcomes is that the subset of women who work and report earnings are not a random subset of all women. It is well-known that policy implications based on selected subsamples may not be generalized to the population.

years -- will enable us to separate the true zeroes (individuals having zero earnings in the previous month) from item non-response. Responses to question 76 in the Income Section on what a newly employed individual expects to earn, can help us impute the missing segment of the monthly earnings distribution.

Hourly wages: Although a small fraction of employment in Turkey takes the form of "day work" and some employees are paid piece rates, wage and salary payments are made lump sum. This being the case it might be fair to say that hourly wage is not a number that crosses the mind of many employees or employers. Nonetheless hourly wage constitutes an important concept for economists and serves as a useful magnitude for describing the outcomes of decisions by employees and employers. Hourly wages are often calculated using information on usual weekly hours of work, under the assumption that the reported hours applied to all weeks of the month, as well as the month for which earnings are reported.[33]

Additional information on the intensive margin of work comes from the question on actual hours of work during the reference week and some additional questions about work at night and over the weekend. As I pointed out, not all answers collected from respondents make it to public use files. Some of these exclusions are due to the policy of exclusion of information that is considered sensitive or may be subject to misuse.[34] Sometimes exclusions are harder to justify. For example, QHLFS contains the record for "actual" hours worked during the reference week but does not have the "usual" hours worked, which arguably represents the incentive margin of employment better.

An unintended consequence of this exclusion is the impossibility of calculating a proper measure of hourly wages. The aggregate manifestation of this can be seen in the average actual hours graph in Figure 3. It is obvious that the switch to a continuous reference increased the likelihood of "zero" actual hours of work, by catching the decline in activity due to national holidays and vacations more accurately. What is more relevant for micro-data users is the annoying concern that individuals who report zero hours may not constitute a random sample of all wage and salary earners, by virtue of having qualified for a paid leave.

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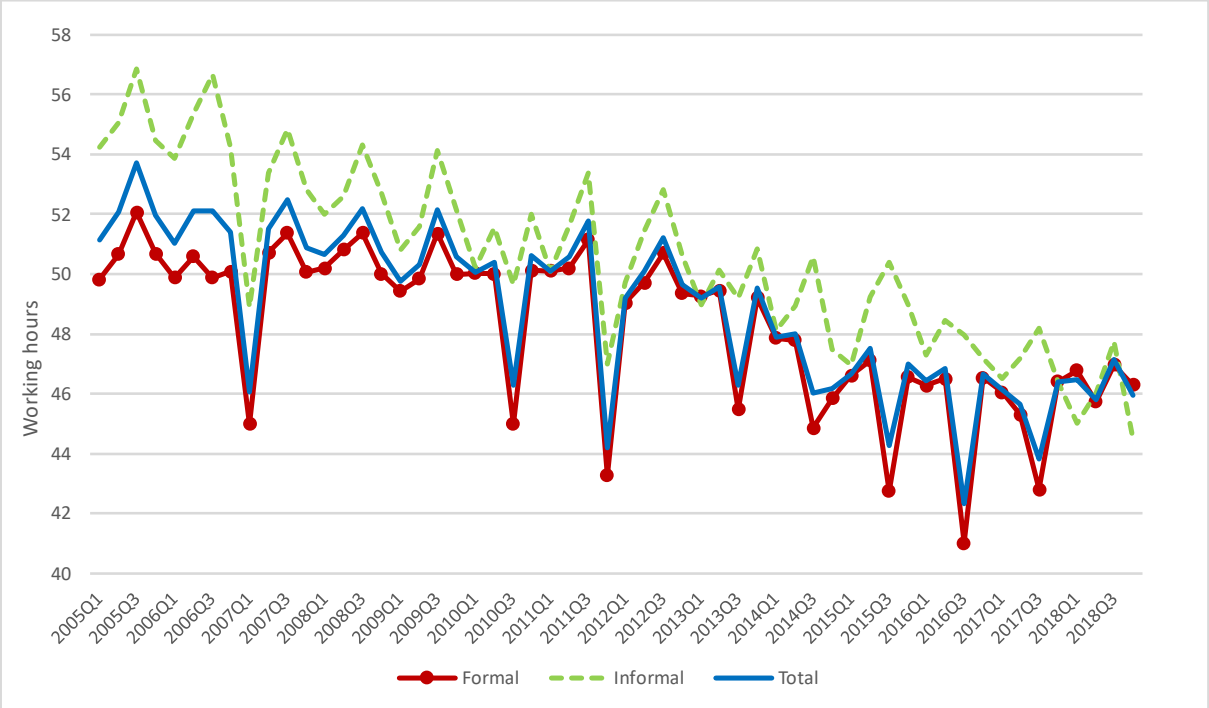
[33] More precise calculations can be made if information on months worked per year were available. This information was collected and included in micro-data sets obtained from earlier implementations of the HLFS but disappeared from the public use files at some point in time. Question 77 in the Employment Section of the sample questionnaire I appended, concerns days of work in the past year. This is an important dimension of measuring the intensive dimension of labor supply. I have never seen the answers included in micro-data files.

[34] Since statistical agencies view statistical indicator generation as their primary objective, they often hide variables which can pave the way to computation of statistics that are not representative of the population. For example, TurkStat does not include indicators that allow users to distinguish regions, or locations (rural vs. urban) in the QHLFS, even though this information is available in the HLFS. The reason given is that the smaller sample size of QHLFS does not support calculation of key statistics (such as the unemployment rate) conditional on region or location.

Figure 3. Weekly average of actual hours of work for wage & salary earners, 2005-2018



Source: Own calculations on weighted micro-data from the QHLFS.

Careful imputation might save the day for the dedicated researchers who want to tackle the problem of zero earnings and zero hours, but better solutions that serve all are available. If TurkStat were to include the "usual" hours variable in the revised editions of the QHLFS, hourly wage calculation can proceed with ease. A preferred solution seems to be available in the case of zero monthly earnings, the concern discussed under the previous subheading. As can be seen from the sample questionnaire included in the appendix, designers of the HLFS survey instrument anticipated the problem and included a question (number 76) that asks the respondent to report the amount she/he expects to receive. Inclusion of this variable in revised public use files will be a huge boon for research.

7. Statistical issues

Even though statistical agencies strive hard to collect data that permits the most accurate picture of reality, the methodologies they adopt may stand in the way of a researcher who wants to employ the data in search of the truth (or a decent publication).

In this Section I examine two issues that have to do with the data generation process. The first one deals with the consequences of using data generated from the RSF for the purposes of drawing inferences from the cross-section. The second deals with the consequences of using a sample drawn from the non-institutional population to address questions that concern the youth.

Attrition and reverse-attrition in the HLFS: Attrition is a panel data concept which captures non-response in later rounds. As I pointed out in Section 2, year 2000 onwards HLFS data contain short panel components and are liable to get affected. Survey follow-up protocol plays a role in the severity of attrition. Since HLFS does not trace households and individuals who move, the problem is exacerbated. A second challenge that arises is *reverse attrition*, namely response followed by non-response in an earlier round. The sample frame of HLFS is address based, and the protocol allows interviewing new households that replace those who left. Additionally new members may join the household, or existing ones who attritted in an earlier round may return. Cleary use of a RSF sets the stage for attrition and return-attrition dynamics and may pose challenges to attainment of the objective of maintaining a representative sample. Statistical agencies deal with the problem by relying on weights constructed as a function of observables, but this standard approach to non-response (known as the Missing at Random or MAR approach) often falls short.

If attrition (reverse-attrition) were exogenous, it would not be a threat to the representativeness of the sample. More often attritional behavior reflects responses to changes in circumstances that individuals experience during their life cycle. Examples include moving to a dorm or attending university in a different town, marriage or divorce, job loss or job start that requires a move, and retirement accompanied by a move. If the event that motivates attrition (reverse attrition) happens to be the objective of a study, ignoring it can bias inferences drawn from the sample. Attrition which fits this description is dubbed “non-ignorable.”

Using 12 rounds of quarterly data from HLFS 2000-02, I quantified the extent of attrition. In the analysis confined to households who have heads in the 20-54 age group (Tunalı, 2009a), on average 8.8 percent households attritted as of the second visit (after 3 months). Conditional on the second visit taking place, an additional 11 percent of households attritted as of the third visit (scheduled six months later). Given that the third visit took place, an additional 7.8 percent of the households attritted (3 months after the third). Not surprisingly incidence of attrition was higher when working age individuals (15+) were studied (Tunalı, 2009b).[35]

[35] The figures were respectively 9.9, 12.9 and 9.2 percent.

These studies revealed that attrition and reverse attrition rates were of similar magnitudes.[36] One might conjecture that drivers of both processes are similar, which is supported by the empirical evidence in Tunalı (2009b). Notably I also documented the presence of non-ignorable attrition and reverse attrition in the HLFS when labor market outcomes are the focus of the study. In later work I addressed the problem of drawing proper inferences from a balanced panel subjected to both types of attrition with several MA students (see Ekinci, 2007; Gökçe, 2011; İkizler, 2011; Özkan, 2013; Tunalı et al., 2021a). The summary evidence from a three-state model of labor market dynamics, reported in Tunalı et al. (2021b) is both revealing and sobering. In balanced panels that capture quarterly and annual dynamics, non-participants in adjoining periods were overrepresented, while employed and unemployment individuals who remained put, as well as those who moved between these states, were underrepresented.

Can attrition affect inferences drawn from the cross-section? Steady state rotation schedule "2-(2)-2" implies that two interview opportunities with the same individual (age 15+) are present. Attrition statistics reported above imply that some individuals contribute only one observation to the annual sample. Furthermore, the evidence regarding non-ignorability with respect to labor market status establishes that neither attritors nor reverse attritors constitute randomly chosen subsets of the original sample. This suggests that depending on the aim of the study, cross-sections may also fail to deliver the requisite random sample.

In Baltacı and Tunalı (2004) we took a crack at the cross-section bias issue by running binary regressions where the dependent variable is an indicator that captures membership in one of three labor market states (not in the labor force, employed, unemployed). We used both raw and weighted micro-data from 12 quarterly rounds of HLFS 2000-02 and defined year and quarter dummies, as well as visit number dummies to explain the incidence of being observed in of three states. Under the null hypothesis that attrition is ignorable, coefficients on the visit number dummies should not be different from zero. Not surprisingly use of weights helped reduce the number of rejections, because weights are based on variables that influence labor market status. Yet two of the three visit number dummies had nonzero coefficients when the dependent variable was used to track in turn, labor force participation and employment on weighted data. This means the shares estimated on the fresh subsamples were different from those estimated on the full sample. In the case of unemployment, the null could not be rejected.

Arguably estimates based on fresh subsamples would be more trustworthy than those based on attrition prone full samples. Furthermore, if the fresh subsamples could be identified, one can test whether statistically significant differences are present, and

[36] In Tunalı (2009a) I used the term "substitution" (and its Turkish equivalent "ikame" in Tunalı, 2009b) to capture response following an earlier non-response. I now see these terms as poor choices, because substitution invokes the use of the questionable practice of replacing a unit that cannot be interviewed by another one. As I mentioned in Section 3, TurkStat ended this practice back in 1994.

whether the trade-off between bias and precision favor use of the full sample. Neither TurkStat, nor other data collection agencies appear to be open to this proposal. They stand behind the questionable use of weights based on the MAR assumption, even though it may be inappropriate for subsamples whose composition is altered by attrition or reverse attrition.

Monthly earnings: Next, we retain the image of the attrition prone RSF and the 2-(2)-2 schedule in our minds and engage in a mental exercise that involves monthly earnings. Those who contribute two observations to the annual data are those who did not attrit (or reverse attrit) and remained employed. Those who report monthly earnings once are either attritors/reverse attritors, or those who did not attrit/reverse attrit but were gainfully employed in only one of the rounds. If we buy into the argument that reverse attritors "in a given round" could have been attritors "in an early round," they may serve as good substitutes for attritors in the sense of helping to recover the "true" earnings distribution. But those who remain in the annual sample and contribute only one piece of earnings information are more likely to be those with lower earnings. Those who enter (or reenter) employment during the year may also be different from those observed in employment at two points in time during the year.

Thankfully a method of obtaining monthly earnings distributions without the "if" and the "but" is available. As implied by the rotation schedule included in the appendix, in the QHLFS a given individual shows up only once. This suggests that the distribution obtained from quarterly rounds might be more representative than that obtained from the annual version, in terms of reflecting the true monthly earnings distribution, and how it adjusts to shocks. I offer a visual test of this conjecture in Figure 4 where kernel density estimates of the natural logarithm of real monthly earnings are shown.[37]

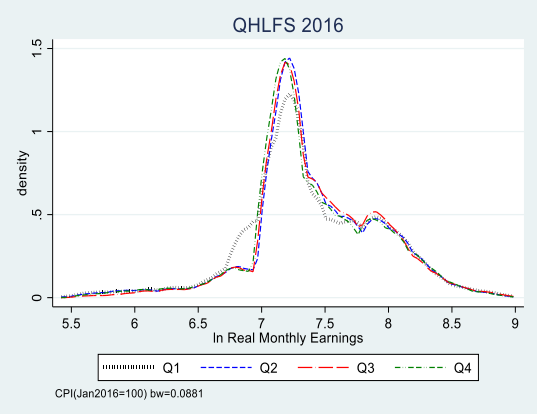
In the case of quarterly (QHLFS) data, real earnings were obtained by using the CPI for the middle month in the quarter. These are shown in panel A of the figure. The graph in Panel B is from the annual HLFS. Since quarter information is not provided in the HLFS, real earnings were calculated by using the average of the CPIs for the months of June and July.[38] Arguably the impression one gets from the annual version is somewhat different from those in the quarterly versions. These are easier to see in Panel C which contains all five.

[37] To minimize the pitfalls of kernel smoothing, all density estimates were obtained by using the same cut-points, the same bandwidth, and the default kernel. To obtain the cut-points, pooled real earnings data from the QHLFS were first trimmed to exclude the top and bottom 1 percent. The remaining range was broken into 100 equal intervals. Natural logarithms of these were used as cut-points.

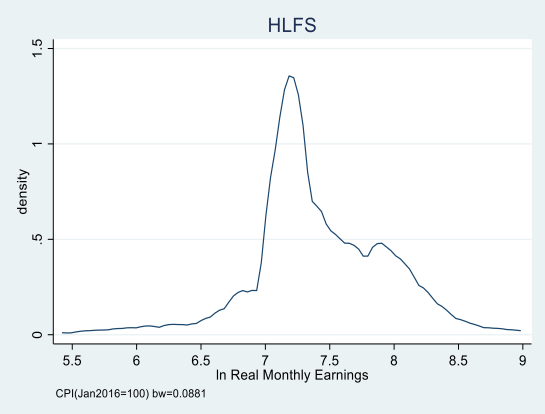
[38] Taking January 2016 as the base, the deflators used for quarterly data were 99.9781 (Q1), 101.304 (Q2), 102.667 (Q3) and 104.872 (Q4). The single deflator used for annual data was (101.782+102.966)/2 = 102.374.

Figure 4. Monthly real log-earnings distributions, QHLFS (panel A), HLFS (panel B), superimposed (panel C)

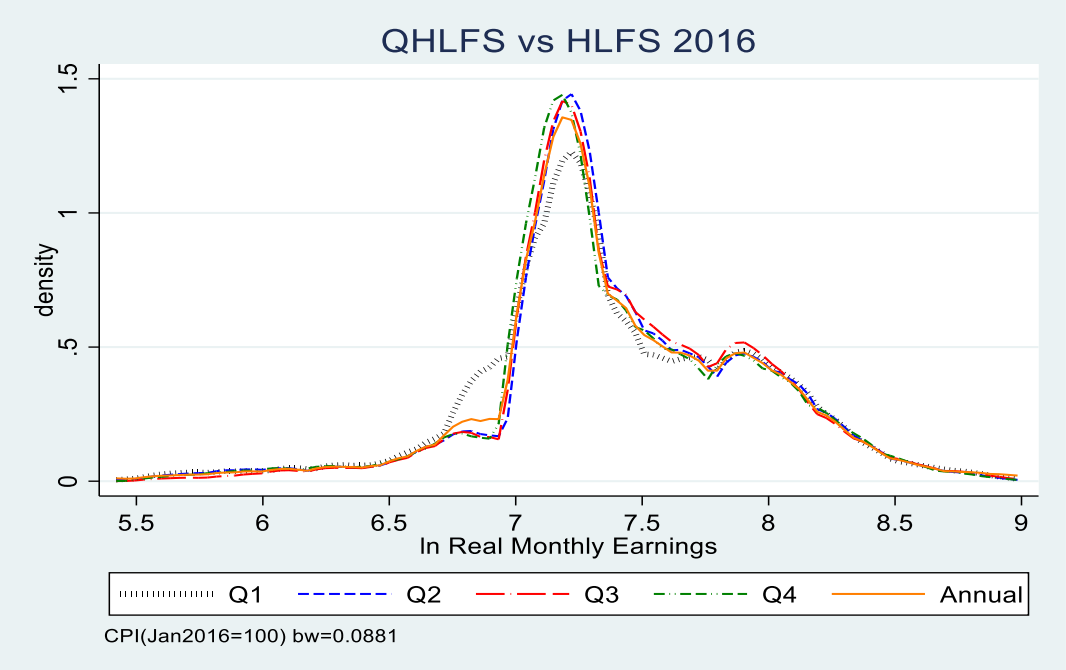
Panel A



Panel B



Panel C



Source: Own calculations on weighted micro-data from the QHLFS and HLFS.

Starting with the QHLFS data shown in Panel A, it is easy to see that the distribution for Q1 is different from the others. It contains a “lump” between 6.8-7.0 log-units which is absent in the other three. This lump is attributable to the method used in reporting quarterly data, namely pooling the data from three months. Since the reference period for earnings is the full month before the reference week, about one-third of the

individuals interviewed in Q1 report earnings from the month of December 2015, before the minimum wage increase became effective. The lump disappears in the other quarterly graphs because they reflect the full impact of the minimum wage increase. The trace of earnings that accrued in December 2015 can also be seen in the annual graph shown in Panel B. Panel C reveals that the sharp peaks observed in the graphs for Q2-Q4 are replaced by a more muted peak in the annual version. Undoubtedly, some of the differences between these distributions is attributable to the less precise nature of the real earnings calculation when annual HLFS is used.

Returning to the question of selectivity that motivated our examination of the earnings data from the QHFLS, visual evidence of a marked difference that would favor use of QHLFS in place of HLFS (which includes some individuals once, others twice) is not present. This is probably attributable to the fact that reverse attritors fill in for attritors. After all, in the absence of refusal to participate in the survey despite presence in the address, both attrition and reverse attrition are driven by the same motives. A more convincing test of earnings-based selectivity of attrition, which can be conducted by comparing data from the fresh subsample that is rotated in and the subsamples interviewed in subsequent visits, awaits availability of access to the short-panel dimension of HLFS.

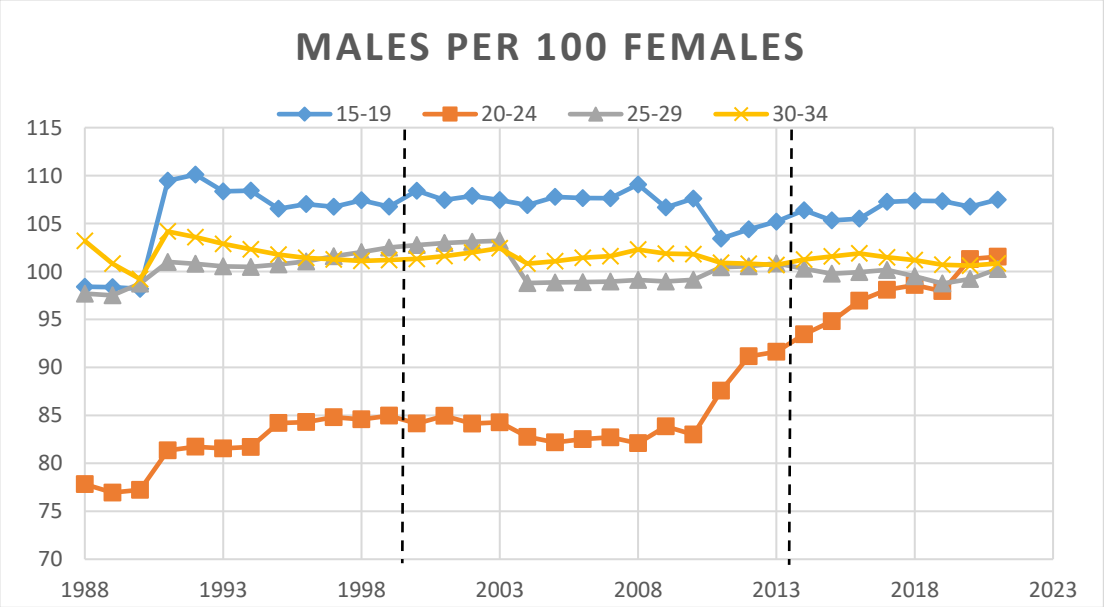
Target vs. sampled population: A key concern in statistical inference from random samples is the overlap between the population that the researcher has in mind and the population from which the sample is obtained. Since the target population of the HLFS is the non-institutional population, micro-data may not be suitable for studying outcomes that depend on age and gender. To substantiate this argument, it helps to take a quick look at the patterns in Figure 5, which shows the sex ratio for various age groups calculated using the (inflation) weights included in the HLFS. The dashed vertical lines respectively mark the switch from HLFS to the "New" HLFS, and subsequently to the "Continuous" HLFS. Remarkably all the series are reasonably continuous around these breaks, despite the changes in the sample frame and the fieldwork protocol. By contrast we can detect major breaks in all the series between 1990/91, and all but that for 15-19 between 2003/4.

The latter is attributable to the switch to the ARS. As mentioned in Section 3 above, TurkStat revised the weights for some of the older HLFS data but stopped short of going back further than 2004. The weights for the original HLFS came from projections based on most recent population censuses, all of which were revised after the 2000 GPC. Yet jumps can be seen between 1990/91 (perhaps 1994/95 as well).

Some variation in the sex ratio -- defined as the number of men per 100 women – may be viewed as part and parcel of working with surveys. The sex ratio by age can vary in the population as well, because of sex-selective mortality. In Turkey the sex

ratio at birth has been stable at 105 and was down to about 103 by age 30-34 in 2021.[39] Now, weights are designed to make the sample look like the population, in our case the non-institutional population. In Figure 5, we see that the sex composition of the non-institutional population is highly age dependent. Females are underrepresented among youth in the age group 15-19, while males are heavily underrepresented among those in the 20-24 age group. Approximate parity is reached in older age groups.

Figure 5. Sex ratio by age group, 1988-2021

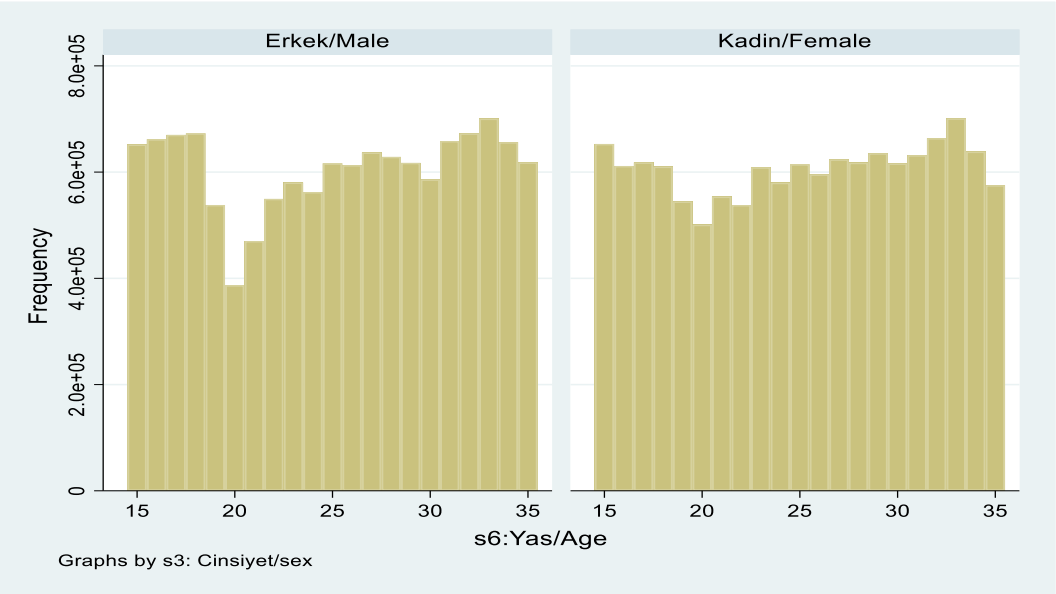


Source: Own calculations on data retrieved from the Labor Force Statistics database, TurkStat.

The likelihood of dorm residence is known to have gone up among those attending universities. Since individuals can complete high-school and start their tertiary education as early as age 17-18, the sample frame of HLFS might conceal some students in age group 15-19. If young females are more likely to graduate from high school in a timely manner and are also more likely to reside in student dorms, a distortion of the type seen in Figure 5 can result. Arguably males may be more likely to live independently and remain within the HLFS sample frame, while females opt for dorms.

[39] See https://statisticstimes.com/demographics/country/turkey-demographics.php.

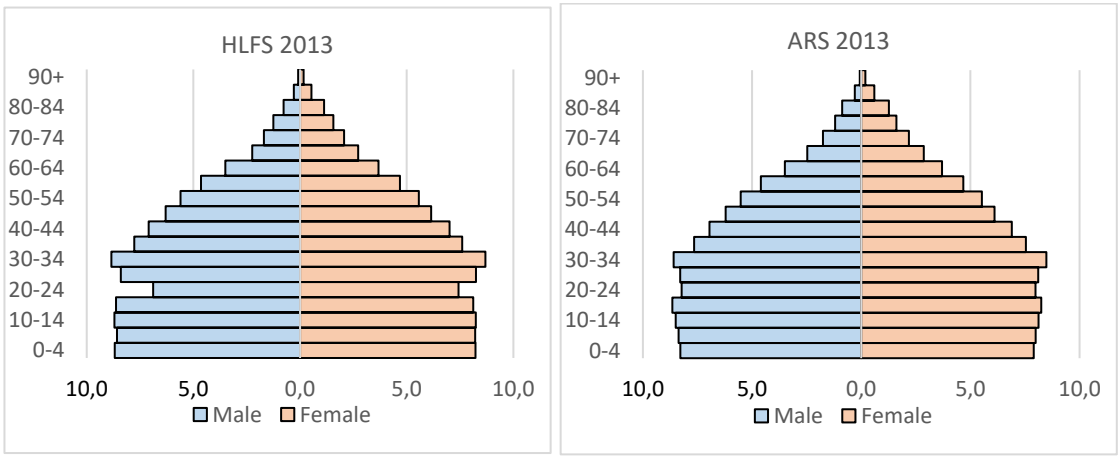
Figure 6. HLFS 2013 age distribution for 15-35 year-old individuals by sex



Source: Own calculations on weighted micro-data from HLFS 2013.

Historically only a minority attended universities. Among males who terminate their schooling early, a second factor emerges: Compulsory military service. By law males who reach age 20 in a given calendar year and are not enrolled in school are obliged to enlist and will be outside the sample frame of HLFS while serving. The series for the age 20-24 group reflects this effect. Completion of schooling is known to have stretched to higher ages over time. The improvement in the sex-ratio after 2010 is attributable to increased university orientation (of both male and females), and the consequent decline in the share of male conscripts who must enlist. Age breakdown by sex over a wider age range obtained from HLFS 2013 shown in Figure 6 supports our arguments. Similar patterns emerge from other rounds of new and continuous HLFS. The key message is that the valleys around age 20 are *not* a feature of the population, they are attributable to the sample frame. Comparison of age pyramids from HLFS 2013 and ARS 2013 given in Figure 7 forcefully drive this point home.

Figure 7. Age pyramids by sex, HLFS 2013 (left) and ARS 2013 (right)



Source: Own calculations on weighted micro-data from HLFS 2013 and TurkStat ARS database.

When the probability of inclusion in the sample frame varies with age and sex dependent processes such as living in a dorm, or doing compulsory military service, the sampled population can be subject to selection bias.[40] A good example of a statistic that can be affected is NEET (Not in Education, Employment, or Training). This statistic was introduced to capture the size of the segment of youth which may be difficult to lure into the labor market and is frequently reported, accompanied by alarmist overtones. When a notable fraction of those at risk of being classified as NEET are not included in the sample frame, the statistic overestimates the size of the intended segment.

A similar argument applies to youth unemployment rates. TurkStat compiles separate labor market indicators for youth in the 15-24 age group by gender. In using these it is important to remember that the sampled population is the non-institutional population. As I explained, the target population of TurkStat has been evolving over time, because of changes in the patterns of schooling and military service. Indicators calculated using denominators which may not be representative of the youth population will fall short of correctly reflecting how the youth are affected by changes.

The preceding examples forcefully illustrate how selectivity can distort inferences drawn from the sample frame of the HLFS. Yet another example of an investigation which can be impacted by sample selection is the transition from school to

[40] Yanık-İlhan (2015) uses single age data from ARS and HLFS 2007-12 to document that statistically significant differences are present in age ranges 17-19 and 20-24. Differences in the latter group are larger and is attributable to the fact that youth who reside in dormitories while attending school (typically university) and males who are doing their compulsory military service drop out of the sample frame of HLFS for some time. Although the prison population is also highly selectively of sex and age, it is too small to impact inferences.

work. Thanks to the special modules, data from 2009 and 2016 HLFS have been popular with researchers interested in this topic. Arguably ages 15-19 and 20-24 provide good windows for studying the transition from school to work, respectively for high school and university graduates. Our discussion underscores the hazards. It is not a good idea to break data for these age groups as in school/employed/unemployed/non-participant or in school/employed/NEET, because the HLFS sample misses the choices made and/or constraints faced by many who are still in school, as well as males who are conscripted.

Evidence of the hazards I have in mind is present in Figure 2, which tracks the educational attainment of the non-institutional population, ages 15-19 over time. Back-to-back drops in the share of high school graduates after 2007 is a consequence of the sample frame, not a disaster. As more and more individuals attended universities and became dorm residents, a larger and larger fraction of those in this age group was hidden from HLFS records.[41] Based on the figure, the share of high school graduates started recovering after the 2012 reform, as more individuals who completed middle school enrolled in high schools. The magnitudes of the changes are not correctly reflected in Figure 3, because the non-institutional population kept shrinking and incidence of hidden high school graduates increased as university enrollments increased.

One way of breaking the grip of the focus on non-institutional population on what can be studied is to rely on occasional random samples drawn from the full population. The structure of the Adult Education Survey conducted by TurkStat provides a glimpse of what a comprehensive survey on education might involve. Unfortunately, it too excludes individuals living in institutions. In the age of CATI, a quick fix is available. Children who are not residing in the household can be interviewed by phone and their schooling and employment status can be recorded separately if they are in a dorm. TurkStat can continue the practice of reporting statistics based on the non-institutional population, but the biases that lead to faulty inferences can be corrected by the researcher community. Given the current constraints, by confining the risk sets to individuals who completed their schooling, proper inferences can still be drawn. This involves changing the target population from non-institutional youth to those who completed schooling. Based on the concerns raised above, stratification by education and gender would be a good idea.

To wrap up, increased tertiary education orientation in the 21st century resulted in the exits of a higher share of the population in their late teens and early twenties from the sampling frame of the HLFS. I tried to show the implications of addressing a research question which is incompatible with the sampled population. In the first step of my

[41] I am grateful to Meltem Dayıoğlu for pointing out the fact that the duration of high school education was extended from three to four years in 2005. This reform applied to students who started high school in Fall 2005 and beyond. As a consequence, there were no public high school graduates in year 2008. One would expect the share of graduates to have recovered in 2009 and increased later, but an increasing share of those who enrolled in higher education dropped from the sample frame of HLFS.

analysis, I focused on the sex-ratio because many outcomes that are relevant for the youth are affected by gender. Also worth mentioning is the fact that ARS records individuals who are residing in institutions such as military barracks and dorms as members of populations of the location that houses the institution. This practice can usher in further distortions at the regional level.

8. Conclusion

In 2023 TurkStat will be celebrating the 35th anniversary of the HLFS, the most comprehensive data set for studying the labor market in Turkey. As someone who has been using the micro-data set since the early 90s, I have always been impressed with the professionalism and talent that has been behind the endeavor. I wanted to contribute to the celebrations by writing an unofficial guide to the HLFS.

Long acquaintances provide the opportunity to see the weaknesses as well as the strengths. After providing an overview of the HLFS, I dug into some lesser-known issues such as non-response and weighting. The first may be viewed as accidents in the field that are beyond the control of the agency. The second consists of remedies to minimize the impact of the accidents. Statisticians who engage in data collection and applied econometricians who use the data have different views on the nature of the accidents and how the corrections should be implemented. Statistical agencies such as TurkStat rely on weights expressed as a function of a short array of exogenous variables so that the weighted sample matches the targeted population. This so-called missing at random (MAR) approach is often the best one for tackling non-response in one shot data collection efforts. But it may not be appropriate in a continuous survey, such as the HLFS, that relies on a rotating sample frame.

The first key argument in the paper is that using methods designed for non-response at the first encounter may not work for handling non-response that occurs in later stages. When the data are collected from a cross-section sample that consists of layers that are differentially affected by attrition (non-response that follows an earlier response) and reverse attrition (response that follows an earlier non-response), the MAR approach to weighting may not support proper inference. The economics literature on non-ignorable attrition offers more suitable methods for drawing inferences from data generated in this fashion.

A second key argument of the paper is that some research objectives are difficult to attain credibly using micro-data from the HLFS, simply because the available sample may not be representative. This has to do with the fact that the HLFS sample frame targets the non-institutional population, which hides the institutional component by design. Clearly a research question that involves both components cannot be addressed by drawing samples from only one component, unless proper adjustments are made. It turns out some questions that researchers try to answer using data on youth aged 15-24,

may be ill-posed. Short of summarizing the examples given in the last Section of the paper, the nature of the problem can be illustrated by reference to youth unemployment rates. It is well-known that youth unemployment rates are quite a bit higher than the headline unemployment rate for adults. This may be a consequence of the focus on the non-institutional population which may overrepresent youth who do not have the best endowments for making the transition to the labor market. The problem may be worse if the composition of the non-institutional population evolves over time, in response to educational opportunities and incentives provided by the labor market.

I would like to underscore that the warnings I have issued are based on the set of questions that emerged in my own work on the labor market and may not be generalizable to all questions. Having said this, I think my quest contains lessons that transcend the boundaries of the examples I gave. By adopting the cautious and critical approach I used, it should be possible to study the implications of the HLFS data collection methodology in the context of other questions.

The amount of effort that goes into the various phases of the HLFS is immense. My sincere opinion is that staff at the TurkStat headquarters who work in departments supporting the HLFS go out of their way to deliver high quality data. The fact that HLFS compares favorably with its counterparts in the EU-LFS quality reports supports my view. Administrators who oversee the HLFS effort may often be viewed as being overly protective of the data and may arguably also err on the side of not being very open about their practices. In the paper I argued that proper methods for tackling the problems I highlighted were often available. Some of these require access to data which are presently unavailable. Short panels embedded in the HLFS constitute the foremost example. Given the time and monetary costs that go into the HLFS data collection effort, it is difficult to find justification for limiting its use by the cross-section components. It is obvious that by allowing access to the short panel components of the micro-data TurkStat will be widening the information base crucial for economic policy making. I am hopeful that TurkStat will use the occasion of its upcoming anniversary to listen to the constructive critique I and others have supplied and move in the direction of transparency and more efficient use of public resources.

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DISCLOSURE STATEMENTS:
Research and Publication Ethics Statement: This study has been prepared in accordance with the rules of scientific research and publication ethics.
Contribution rates of the authors: First author (100%).
Conflicts of Interest: Author states that there is no conflict of interest.
Financial research support statement and Acknowledgement: This article draws on information gathered from numerous TurkStat publications, consultations with experts in TurkStat and colleagues that spread over many years, and most importantly on research assistance of many former and current students. I am grateful to all – the list is long, and my memory is liable to fail me. Semih Tümen gave me rapid feedback on an earlier draft that helped me to sharpen my arguments, and Aysıt Tansel and Seyfettin Gürsel offered many helpful suggestions. Esra Öztürk provided crucial assistance while assembling my paper. I am indebted to Meltem Dayıoğlu for an extremely careful reading of the pre-submisson draft and the long discussion that followed, which helped me to fix some incorrect and/or misleading arguments. I am also grateful for the feedback from referees which prompted many revisions. Careful readers might note that I reused some graphs from earlier public presentation occasions. Finally, I would like to thank Prof. Dr. A. Suut Doğruel, the late Editor of this journal, for encouraging me to share the lessons from my long acquaintance with the HLFS in print. If it weren't for his friendly insistence, I'd still be procrastinating. Naturally I am responsible for any remaining factual and judgement errors.
Ethics Committee Approval: Ethics committee approval was not obtained because human subjects were not used in the research described in the paper.

Appendix

Table A1. Rotation plan for HLFS 2000-2004

Rotation number	2000				2001				2002				2003				2004			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
01	E1x																			
02	(E1)	(E2)x																		
03	O1x	(E1)	(E2)x																	
04	(O1)	(O2)x	(E1)	(E2)x																
05	[E1]	(O1)	(O2)x	[E2]	[E3]x															
06	{E1}	{E2}	(O1)	(O2)x	{E3}	{E4}x														
07	[O1]	{E1}	{E2}	[O2]	[O3]x	{E3}	{E4}x													
08	{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x												
09		{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x											
10			{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x										
11				{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x									
12					{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x								
13						{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x							
14							{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x						
15								{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x					
16									{O1}	{O2}	{E1}	{E2}	{O3}	{O4}x	{E3}	{E4}x				

Source: Modified version of the table given in DIE (2001).

Legend: Subsamples are marked by an odd number (O), or an even number (E). The "x" that follows a number identifies the terminal visit. Total number of planned visits are shown using 'no mark' = 1 visit; (.) = 2 visits; [.] = 3 visits; {.} = 4 visits. Steady state is reached in 2001 Q2. Highlighted cells from 2000-02 identify the samples used in Tunalı (2009a,b).