

# Micro Housing: No Contribution to Affordable Housing – a Berlin Case Study

*Simon Hein, Johannes Nießen*

(Simon Hein, M.Sc., Institute of Urban and Transport Planning, RWTH Aachen University, hein@isb.rwth-aachen.de)  
(Johannes Nießen, M.Sc., Institute of Urban and Transport Planning, RWTH Aachen University, niessen@isb.rwth-aachen.de)

## 1 ABSTRACT

The limited body of research on micro housing, which refers to small-scale housing units for single-person households, often associates this with housing affordability. In this study, we analyse the affordability of micro housing based on housing advertisements using Berlin as case study area. Therefore, we focus on different target groups of micro housing named by industry-driven research.

On the one hand, we argue that the relevance of some of these groups for housing affordability from an urban development planning perspective is questionable. On the other hand, the results indicate that micro units are hardly affordable for target groups such as students, who are often affected by housing affordability problems. Our study illustrates that for Berlin there is a substantial mismatch between the potential contribution postulated in literature and the actual contribution of micro units to affordable housing.

Keywords: reduction of living space, micro-apartments, housing affordability, micro housing, rental housing market

## 2 INTRODUCTION

Providing affordable housing is one of the main challenges of urban development planning. At the same time, it is high on the agenda of public and media discourse. In Germany, housing affordability problems receive substantial media attention. Policy makers attempt to reduce these problems by means of regulations. An example of statutory intervention in the housing market at the federal level are the regulations on the permissible rent level under Section 556d of the German Civil Code (Mietpreisbremse), while at the state level the Berlin Senate passed a rent cap (Mietendeckel) in 2019.

Pressure on housing markets does not only lead to actions of policy makers. Investors and developers also adapt their actions to market conditions. We interpret micro housing as such a response, additionally driven by e.g. the household development. While in 1974 only 35% of all urban households in Germany were single-person households, their share had risen to 50% by 2018 (Destatis 2020).<sup>1</sup> From this increasing share, the relevance of micro housing, which refers to small housing units with different rental periods for single-person households, can be derived. The press also reports, for example, on the boom in micro apartment facilities in major German cities (see, for example, Mattauch 2017; Ochs 2016). Here, micro apartments are praised as "rising stars of the housing market" (Ochs 2016). By contrast, there are only few scientific publications on the topic of micro housing. These often associate micro housing with affordable housing (see Dickerson 2016; Iglesias 2014; Infranca 2014). However, empirical analyses of the affordability of micro housing are lacking in the literature.

In this paper, we aim to situate micro housing in the context of affordability. To this end, we first explain the necessary theoretical foundations of both micro housing and affordability. Thereby, we focus on different approaches to assess affordability. Subsequently, we analyse the affordability of micro housing in Berlin on an empirical basis. First, however, we clarify our understanding of micro housing and describe its characteristics focusing on the German housing market.

## 3 MICRO HOUSING IN GERMANY

A precise definition of micro housing is yet to be established. The German planning law (Bauplanungsrecht), which differentiates between residential housing and commercial accommodation, offers a point of orientation in order to situate micro housing. For residential housing in the sense of the planning law, a certain duration of residence is determinant. Some publications cite a minimum rental period of three months as a reference (Gregorius 2017), even though the planning law does not precisely define this as limit (Ewer 2017). Commercial accommodation is characterised by shorter rental periods and additional services (Federal

<sup>1</sup> In German cities, with more than 100,000 inhabitants.

Administrative Court, ruling of 29 April 1992). Thus, a basic distinction between residential and commercial concepts is necessary.

In the meantime, there is a category of dwellings with increasing diversity attributed to micro housing. Its emergence is linked to the demand for short-term rentals and trends such as the rise of multilocal lifestyles (Hilti 2013). While apartment hotels are an example for commercial accommodation, micro-apartments are mainly assigned to residential concepts. Boarding houses are located somewhere in between. Here, the services offered and the intended rental periods determine the classification. An overview of the different concepts is shown in figure 1.

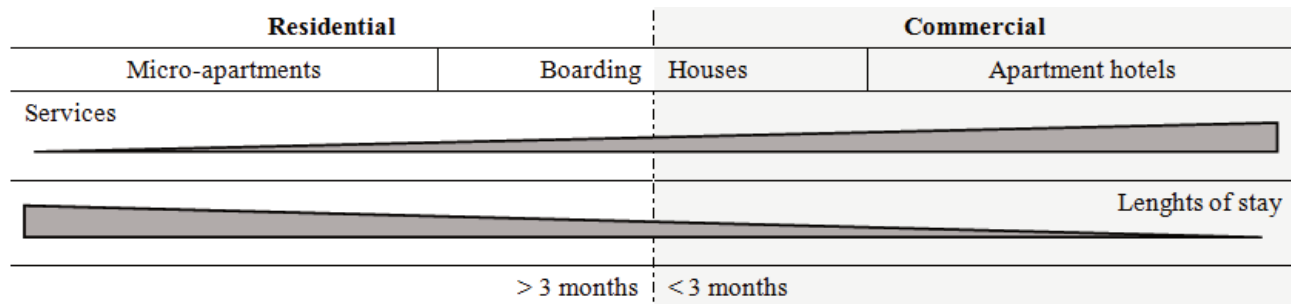


Fig. 1: Differentiation between residential and commercial concepts of micro housing.

These residential and commercial concepts of micro housing have in common that they offer living space - often furnished - for single-person households, providing a kitchen or kitchenette and a separate bathroom. This distinguishes them from single room occupancies (SROs) in which kitchen and bathroom are shared with other residents. As the term suggests, a reduction in individual living space is also a constitutive factor for micro housing. However, the definition of maximum floor spaces requires consideration of local market conditions. Consequently, maximum floor spaces of micro housing are to a certain extent linked to the average studio sizes of the market considered (ULI 2014). Literature defines the characteristic floor space of micro housing as 20% to 30% smaller than that of conventional studios (ULI 2014).

As a result of the reduction in individual living space, micro housing often appears in high-density neighbourhoods. It is also associated with high tenant turnover rates. Suppliers prior target groups of micro housing are students, weekly commuters, and employed persons whose profession requires a high degree of spatial flexibility (Ponnewitz und Kienzler 2016). The group of employed persons can be differentiated into persons who are looking for a housing unit as their main or secondary residence. A summary of the typical target groups as well as their motives for moving into a micro home can be found in table 1.

Target groups	Motive	Example
Persons in educational stage	Studies	Students
	Apprenticeship	Apprentices
	Internship	Temporary internship in another city
Employed persons	Project work (secondary residence)	Temporary projects in another city
	Weekly commuting (secondary residence)	Employed people whose main residence is so far away from their place of work that they need a housing solution during the week
	New recruitment	Transitional solution during the probationary period, orientation period on the housing market
	Temporary employment (mainly professionals)	Doctoral students, assistants, private lecturers
	Job-related mobility requirements	Cabin crew, pilots and field staff
Others	Change of residence	Bridging the orientation period on the housing market
	Intentional reduction of individual living space	Senior citizens, singles

Table 1: Target groups and residence motives of micro housing (according to Gregorius 2017; Ponnewitz und Kienzler 2016).

Even though exact surveys of the stock of micro units are not available due to differentiated supplier structures, research points to the dynamic development in this market segment (see, for example, CBRE 2018; Savills 2018). In Germany, the spatial focus is on major cities with strong growth and high student numbers (Glatter et al. 2014), where housing demand exceeds supply (Neubrand und Brack 2018). In order to explain the market dynamics of micro housing, various trends driving the demand are listed in industry-led research. In addition to the increase in multilocal lifestyles, individualisation processes that are reflected in a steadily rising number of single-person households are mentioned.

It is unclear, however, to what extent the market situation in many major cities encourages the development of the micro housing stock. Small-scale housing units temporarily occupied do not correspond to the actual housing preferences of the target groups, which consist mainly of younger cohorts (Frank 2019). For example, for most residents the decision to move into a micro-apartment is a result of the restrictions that a constrained housing market situation imposes on their choice of housing and they see this as a compromise (Clinton 2018). Thereby, they typically trade off the idea of living alone and the amount of rent that is perceived as affordable against reduced living space (Clinton 2018). The location of the dwelling is very relevant here; micro housing is usually located in city centres or neighbourhoods close to city centres. Restrictions on housing choices can thus also serve as an explanation for the increasing supply of micro housing.

#### 4 HOUSING AFFORDABILITY

Approaches to assess affordability exist for both home ownership and renting. In this study we focus on rented housing, as this is the dominant housing form in major cities in Germany.

Affordability combines housing cost burden and housing quality (Haffner 2018; Stone 2006b). To measure and assess affordability, indicators and standards must be defined for both aspects. A dwelling is considered affordable if it meets the standards of both housing quality and housing cost burden.

Due to difficulties in setting minimum standards for housing quality, approaches to assess affordability primarily involve the housing cost burden. Minimum standards for housing quality can be legally established in Germany at the level of the federal states, for example, with regard to living space. In Berlin, for instance, an apartment must have at least 9 sqm for each occupant from the age of seven onward and at least 6 sqm for each child up to the age of six (law to eliminate housing shortages in Berlin (Gesetz zur Beseitigung von Wohnungsmissständen in Berlin (WoAufG Bln)). The multidimensionality of housing, which means that housing has a social dimension in addition to a physical dimension, is an obstacle to the definition of minimum standards. Minimum standards for social needs such as identification or self-realisation can hardly be defined. Nonetheless, neglecting aspects of housing quality is a central weakness in existing approaches for analysing affordability.

The indicator of the housing cost burden generally corresponds to the ratio of housing costs and household income. This ratio approach is widely used due to simple calculation and low data requirements. There are differences in the housing costs used and the standard defined. The European Union defines housing costs as gross warm rent including electricity costs, which should not exceed 40% of net household income (eurostat 2014). The ratio approach ignores the fact that the share of non-housing costs in income depends on the level of income and the household characteristics. Studies have shown that the ratio approach underestimates the impact on lower income households and larger households, as they have to pay a larger share of their income for non-housing costs (Stone 2006a; Stone et al. 2011).

As an alternative to the ratio approach, the residual income approach was developed, which does not identify a ratio but the difference between disposable income and housing costs as an indicator for affordable housing. This approach focuses on the idea that the income of a household minus housing costs should be sufficient to cover non-housing costs adequately (Grigsby und Rosenberg 1975). If this is the case, the dwelling is considered affordable for the household. Non-housing costs are, for instance, costs for food, mobility or clothing. Non-housing costs are higher for larger households. Compared with the ratio approach, the understanding of affordable housing is therefore changing. A dwelling cannot be affordable per se. Whether a dwelling is affordable or not depends on the household characteristics and its monetary possibilities (Stone 2006b). In contrast to the ratio approach, the estimation of affordability is therefore

differentiated according to household type. In addition, standard values for non-housing costs must be applied. This is the reason why the residual income approach requires more data than the ratio approach.

## 5 CASE STUDY

In this paper, the city-state of Berlin serves as case study area. As a reaction to the price dynamics of asking rents for new lettings, which are particularly high even in comparison to other major cities in Germany, the Berlin Senate passed the draft of a rent cap (Gesetz zur Mietbegrenzung im Wohnungswesen in Berlin Berliner MietenWoG) in mid-2019. In this law, the maximum rents to be paid are defined depending on the year of construction and features of the apartments. For Germany, this represents a turning point in the political reaction to the lack of affordable housing in major cities. Excluded from the regulations, which are effective subject to a resolution in the Berlin House of Representatives, are apartments constructed 2014 or later.

### 5.1 Data and methods

In this context, we analyse apartment advertisements of micro units. By micro units we mean studios with a floor space of 15 sqm to 28.5 sqm and with both a private bathroom and a kitchen or kitchenette. Since we question micro housing as a measure against the lack of affordable housing, we only examine apartments built in 2014 or later, which will not be subject to the legal regulations regarding maximum rent levels in the future. The maximum floor space for micro units is based on the determination that micro units are 20% smaller than common studios in the respective submarket (ULI 2014). In Berlin, the median size of studios is 35.6 sqm.<sup>2</sup> Accordingly, the maximum floor space of micro units in Berlin is 28.5 sqm. The minimum floor space of 15 sqm follows the assumption that a studio with a floor space smaller than 15 sqm hardly has a bathroom and kitchen or kitchenette. At the same time, these studios meet the minimum floor space standards prescribed by law (see section 3). In order to be able to present the findings on micro units more clearly, we also define a comparison group that is similar in all parameters except for floor space. These are also studios built in 2014 or later, which have a floor space of more than 28.5 sqm and less than 70 sqm. The upper limit of 70 sqm is due to the fact that the majority of single-person households in Berlin (75%) live in apartments with a floor space between 30 sqm and 70 sqm.<sup>3</sup>

Our data is based on advertisements of rental apartments put up on the platform ImmobilienScout24.de between 11 November 2019 and 15 January 2020. In total, the database comprises 11,268 advertisements with complete details. It contains 127 advertisements that fulfil the conditions of our definition of micro units (corresponds to approx. 5% of all advertisements for apartments with a construction year of 2014 or later). The comparison group comprises 291 advertisements. The focus on a single study area and the comparatively small volume of data limits the representativeness of this study. Since the rental contracts of micro units are often adapted to the semester periods of universities (Engelhardt und Kaljic 2017), many tenant changes occur at the end or beginning of the semester. Due to the chosen survey period, these tenant changes are not captured.

Asking rents are the central analysis parameter. Since both the residual income approach and the European Union ratio approach include the total cost of housing, our analysis focuses on the total rent as the sum of net rent and utilities. In this respect, there is a limitation regarding the comparison between the group of micro units and the comparison group. While the total rent for micro units usually includes heating and electricity costs, electricity costs are not included in the total rent for the comparison group. Heating costs are partially included in advertisements of the comparison group. In addition, it is common practice to let micro units partially furnished.

### 5.2 Results

In a first step, we compare the total rent and the price per sqm of micro units with those of the comparison group (see figure 2). The price per sqm also refers to the total rent. A central finding is that the median of the total rent of micro housing is higher than that one of the comparison group (micro housing: EUR 674; comparison group: EUR 655). This is particularly noteworthy since, according to our definition, the units of the micro housing group, without exception, have less living space than those of the comparison group

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<sup>2</sup> Own calculations based on census data (Statistische Ämter des Bundes und der Länder 2020).

<sup>3</sup> Own calculations based on census data (Statistische Ämter des Bundes und der Länder 2020).

(median micro housing: 24.0 sqm; median comparison group: 36.2 sqm). In contrast, the spread is much smaller for micro units than for the comparison group. While the minimum and maximum total rent for micro units is EUR 440 and EUR 1,150 respectively, the minimum and maximum total rent in the comparison group is EUR 270 and EUR 1,560 respectively.

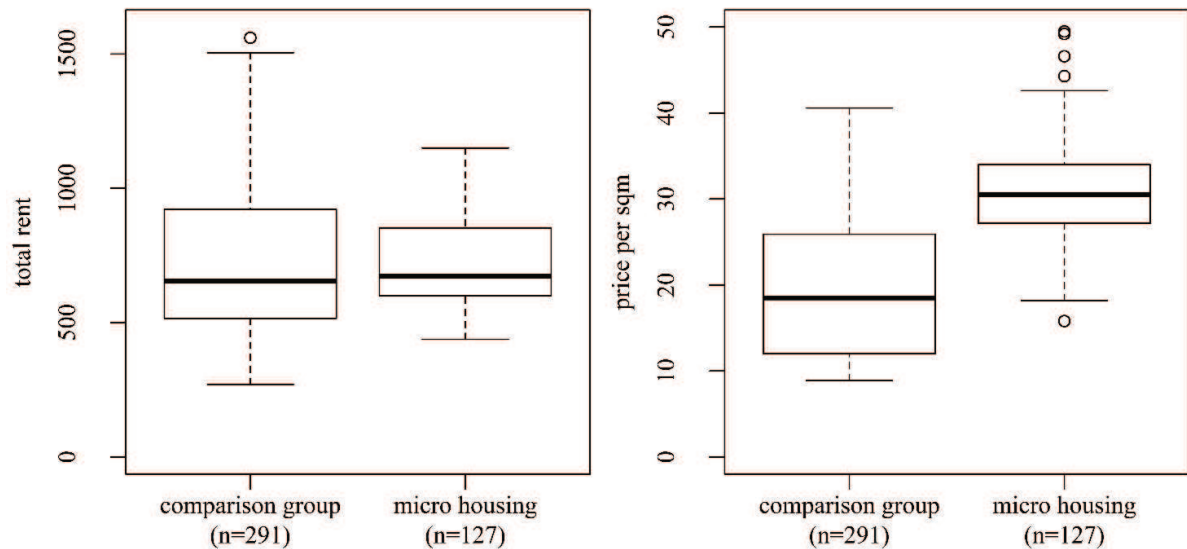
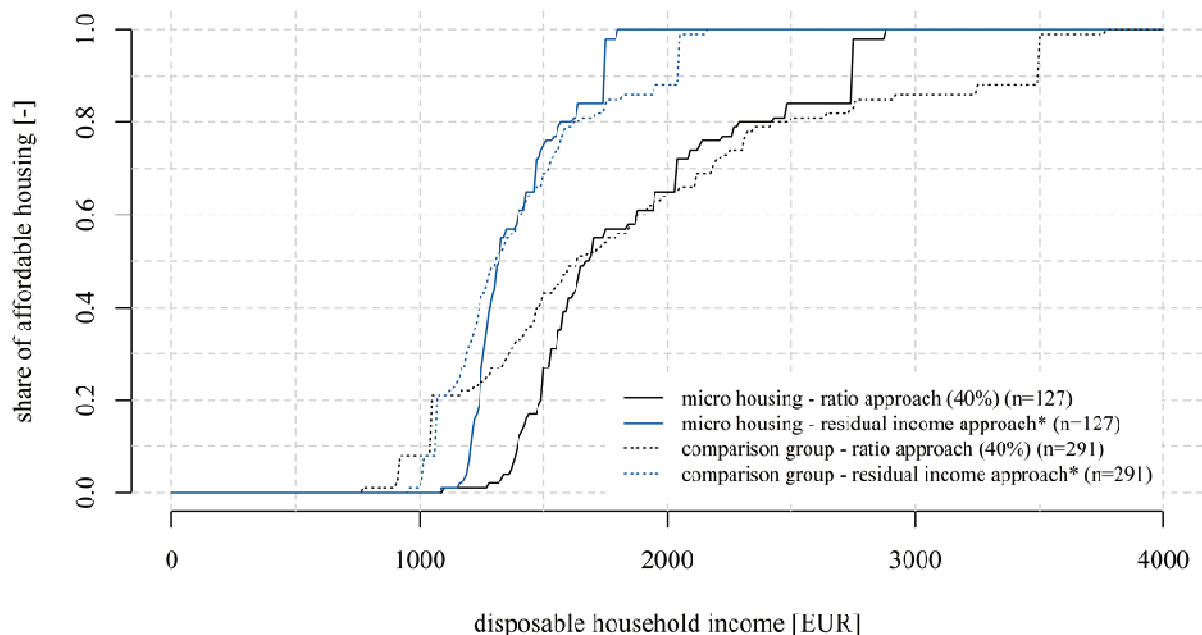


Fig. 2: Total rents and prices per sqm differentiated between micro units and units of the comparison group (own calculation).

In terms of the price per sqm, there is a clear difference between the micro housing group and the comparison group. The median of micro housing is EUR 30.5 per sqm and the median of the comparison group is EUR 18.5 per sqm. The prices per sqm in the micro housing group are between EUR 15.8 and EUR 49.5, whereas the maximum price per sqm in the comparison group is EUR 40.6. The minimum price per sqm in this group is EUR 8.9.

In order to enable conclusions to be drawn about the affordability of micro units, we apply both the ratio and the residual income approach to the database. Figure 3 shows the share of affordable housing in the database depending on household income. Again, we differentiate between the micro housing group and the comparison group as well as between both approaches to assess affordability.



\*Household member: adult single. Non-housing costs EUR 648; the value corresponds to 1.5 times the standard requirements based on REEG  
Standard requirements (Regelbedarf) is the necessary livelihood, as defined in Germany, which is necessary to guarantee the socio-cultural subsistence level REEG. Law for the determination of standard requirements according to § 28 of Volume XII of the Social Insurance Code (Gesetz zur Ermittlung der Regelbedarfe nach § 28 des Zwölften Buches Sozialgesetzbuch)

Fig. 3: Share of affordable housing depending on disposable household income (own calculations).

Applying the residual income approach, 10% of the advertised micro units are affordable with a disposable household income of EUR 1,210 and half of these are affordable with a household income of EUR 1,320. In contrast, when applying the ratio approach, a household income of at least EUR 1,400 is required for 10% of the advertised micro units to be affordable. If a household has an income of EUR 1,680, half of the advertised micro units are affordable for that household. With a disposable income of EUR 1,800, all micro units in the sample are considered affordable under the residual income approach, whereas the ratio approach would require a disposable income of EUR 2,880. If we compare micro housing with the comparison group, it is noticeable that with a low income, proportionally more studios of the comparison group are affordable. This effect is particularly evident when applying the ratio approach. In order for 20% of the studios compiled to be considered affordable for a household when applying the ratio approach, a disposable income of EUR 1,490 is required for the micro housing group, whereas for the comparable group only EUR 1,050 is required. This effect exists up to a share of 50% of affordable housing in the respective groups. Starting from this point the graphs of the micro housing group and the comparison group are approximately identical up to a share of 85%.

In order to be able to evaluate micro housing with regard to its affordability, we analyse it for the different target groups named in table 1. This is necessary because the target groups differ from one another in terms of their housing budgets. Table 2 shows the income distribution of single-households in Berlin differentiated by employed persons and persons in educational stage.

net household income [EUR]	share of affordable micro units		employed persons		persons in educational stage	
	ratio approach	residual income approach	relative frequency	cumulative frequency	relative frequency	cumulative frequency
0	0.00	0.00	0.00	0.00	0.00	0.00
500	0.00	0.00	0.14	0.14	0.47	0.47
900	0.00	0.00	0.22	0.36	0.42	0.88
1,300	0.02	0.44	0.10	0.46	0.06	0.94
1,500	0.27	0.75	0.21	0.67	0.06	1.00
2,000	0.65	1.00	0.16	0.83	0.00	1.00
2,600	0.84	1.00	0.08	0.91	0.00	1.00
3,200	1.00	1.00	0.10	1.00	0.00	1.00

Table 2: Household income distribution differentiated by target groups of micro housing in Berlin (single-households only) and the corresponding share of affordable micro units (own calculations; data of Berlin-Brandenburg Office of Statistics (Amt für Statistik Berlin-Brandenburg 2020)).

Persons in the educational stage, especially students, are a comparatively homogeneous socio-economic group. In the case study area, nearly 90% of this target group have an income below EUR 1,300. The average monthly income of students in Berlin is EUR 1,015 (Middendorff et al. 2017). This means that none of the advertisements recorded in the survey period can be rated as affordable for students with an average income, which applies to both the ratio and the residual income approach.

From a household income of approx. EUR 1,200 onwards, the share of affordable micro units depends strongly on whether the ratio or residual income approach is applied. When the ratio approach is used, no micro units are affordable at all for persons in educational stage with an income between EUR 900 and EUR 1,300. In this income range, to which 42% of the persons in the educational stage belong, 44% of the advertisements compiled are affordable when applying the residual income approach. For those from this group with above-average incomes (more than EUR 1,015), some of the advertisements are therefore affordable.

The group of apprentices has an average income of EUR 908 per month (BIBB 2019). Analogous to students, the prices of the advertisements recorded in Berlin are therefore above the affordability standards of the ratio and residual income approach for apprentices, which is why no contribution to affordable housing is identifiable here. Internships of three months or more are subject to the minimum wage law (Mindestlohngesetz) (Section 22 (1) sentence 2 nos. 2 and 3 MiLoG) in Germany and are therefore

remunerated at least at minimum wage. This results in a net income of approx. EUR 1,200 per month.<sup>4</sup> Even for such earnings, hardly any affordable advertisements have been recorded in the case study area. In summary, the micro units recorded do not represent an affordable form of housing for persons in the educational stage if they do not have an above-average income. This applies both under the ratio and the residual income approach.

Employed persons and private individuals are a much more heterogeneous group, which is why we cannot use meaningful average incomes for the affordability analysis. Nevertheless, the income distribution of employed persons living alone in Berlin allows us to classify these group. For employed persons with a net income of EUR 1,500, three quarters of all advertisements are affordable according to the residual income approach. However, almost half of them (46%) earn less than EUR 1,500. To what extent micro housing is now relevant and affordable for the different subgroups of employed persons will be discussed in the following section.

## 6 DISCUSSION

### 6.1 Target groups of micro housing and housing affordability

The results suggest newly constructed micro housing, even though it focuses on people in the educational stage as a target group, does not contribute to affordable housing for this very group. The incomes used are subject to the restriction that the disposable income of persons in the educational stage often depends to a large extent on family allowances. Financial support from relatives may increase if the use of funds is deemed appropriate (Brauckmann 2017), which is not reflected in the present assessment. The surveyed prices exceed the affordability standards so significantly that no fundamentally different results are to be expected even with this effect taken into account. However, the results should not lead to the assumption that the inhabitants of micro units themselves consider the units to be unaffordable. People accept different housing cost burdens at different stages of life (Hulchanski 1995). Therefore, it is not surprising that Clinton (2018) identifies affordable rent as the main motive for moving into micro-apartments in a survey of residents. Consequently, housing affordability assessed using the common approaches may differ from the subjectively perceived affordability.

The target group of employed persons is diverse in socio-economic terms. However, the income distribution shows that about half of the working population living alone in Berlin have a net household income, for which the choice of the affordability indicator is decisive for assessing how they are affected by affordability problems (see section 5). In other words, even in the case of net incomes that fluctuate around the average, the results vary widely depending on the approach used. In addition to the findings outlined in Section 4, our results indicate that the ratio approach overestimates the extent to which single-person households with average incomes are affected by affordability problems compared to the residual income approach.

However, providers of micro housing focus especially on short-term rentals. This is the case for people who are involved in project-related activities needing a secondary residence for these activities. The same applies to weekly commuters who live in a second home at their place of work. The question arises to what extent this temporary demand for housing is relevant to the discourse on affordability, which has so far addressed less solvent, permanent demanders. In the case of project-related activities, the rent may be paid by employers or clients. In this scenario, high rents would be a problem for companies rather than for tenants leading to economic rather than social implications. Another argument against considering this group in the context of affordability is that the search for a secondary residence can also be interpreted as decision to maintain the main residence. If demanders were to dissolve their main residence, their housing budget for the place of work would increase. We are not overlooking the social consequences of such a decision. We would rather like to raise the question: From an urban development planning perspective, shall there be a legitimate claim to an affordable secondary residence? How relevant is the number of people with such a claim in quantitative terms?

In contrast, the target group of newly employed persons is looking for a main residence. Here a heterogeneous income structure can be assumed, so that lower income groups are included. This group is

<sup>4</sup> Assumptions: EUR 1,621 monthly salary (gross); tax class I; West Berlin; no children; no church tax; statutory pension and health insurance.

distinguished from other demanders by the fact that they are not actually looking for temporary but permanent accommodation. If a flat is needed for a period of several weeks or months in order to orientate oneself on the housing market, this points to constrained market conditions. This suggests a lack of affordable conventional housing, which temporary forms of micro housing are intended to compensate for. From an urban development planning perspective, new entrants should be placed in the context of affordability as a group whose representatives are relevant to affordable housing but need permanent housing solutions. Longer periods of orientation in the market, resulting in a quantitatively relevant demand, should not be the objective.

Among people working in temporary employment, especially professionals are seen as a target group for micro housing (Savills 2018). Thus, the examples of temporary employment in table 1 can be assigned to the science sector, which is characterised by fixed-term employment and frequent changes of location (see, for example, Klecha und Reimer 2008). Part-time contracts are also common, which is why affordable housing is important for this group with its temporary demand. This applies in principle to other forms of fixed-term employment, assuming that changing employment patterns are accompanied by corresponding changes of location. If this is not the case, however, temporary employed persons are not the short-term demanders defined as target group of micro housing.

Other private individuals who bridge a orientation phase on the housing market after a change of residence only become target groups for micro housing if conventional apartments are not sufficiently available. These, we also place in the context of affordable long-term housing.

Finally, the target groups include senior citizens and other private individuals who intentionally want to reduce their individual living space. In principle, these are relevant groups in the context of affordability. In particular older households that live in rented housing are often affected by high housing cost burdens (Gordo et al. 2019). The high housing cost burdens of senior citizens are also linked to remanence effects, which drive the increase in the individual take of living space in Germany. In general, micro housing has the potential to provide older households with affordable housing. To what extent the forms currently dominating the market do so is questionable. For example, accessibility in micro-apartments is difficult to realise (Engelhardt and Kaljic 2017), which is why they generally fail to meet a basic requirement of senior citizens.

## **6.2 Emerging research problems from an urban development planning perspective**

Leaving the level of the target groups behind, we will discuss the results with regard to their implications for urban development planning in greater depth. On the surface, micro units seem to fulfil the objectives of investors and developers, occupants, and urban development planning. They are supposed to reduce the take of individual living space, meet the return expectations of investors, and be affordable. Our analysis results suggest that micro housing is a way to achieve high rents per sqm and thus increase returns. In comparison to the group of conventional newly constructed studios, they show significantly higher rents per sqm. The difference in the median values of EUR 12 is partly due to the fact that they often include furnishings. Also, construction costs for smaller apartments are generally higher due to more complex building technology and a greater proportionate use of space in corridors and stairwells. Nevertheless, the development of supply and investment volume indicate the attractiveness of this market segment for investors (see Savills 2018). Micro units are also accompanied by low levels of individual living space. On the other hand, the results of the analysis do not indicate a contribution to affordable housing.

From a municipal perspective, one factor that has so far been neglected is becoming increasingly important for affordability: the length of rental periods. It is to be discussed from which rental periods local authorities consider affordable housing to be necessary. Trends such as the flexibilisation of employment and increasing multilocal lifestyles, which are seen as driving forces behind short-term rentals, must be assessed in terms of their quantitative importance for housing demand. This group must be considered in relation to the unmet long-term demand. Local authorities should also bear in mind that unmet permanent demand can induce additional temporary demand. This is especially true against the background that short-term micro housing is mainly located in major cities with high demands causing housing affordability problems. From an urban development planning perspective, the possible need for affordable short-term rentals depends on the actual demand, its income structure, and intended rental periods. There is a need for research here. The question of



whether the existing forms of micro housing, both residential and commercial, can provide suitable affordable solutions to this problem is also raised.

With regard to housing quality, the reduced living space of micro housing indicates that meeting needs such as self-realisation is limited. The extent to which this can be compensated by the location and amenities of an urban environment is questionable. At the same time, the level of rents corresponds to that of the comparison group, whose units are larger. From the point of view of socially equitable urban development, maximisation of rents per sqm does not appear to be beneficial. If, for example, micro-apartments are suitable for the development of residual urban areas on emitting transport infrastructure which are not fit for conventional housing (Engelhardt and Kaljic 2017), noise pollution must also be taken into account when assessing housing quality. Further research on this issue is also required from an urban development planning perspective.

## 7 CONCLUSION

Although affordability and micro housing are brought together in the existing literature, we see the need for a differentiated reflection. First, two levels need to be considered:

- Which of the target groups of micro housing are relevant in the context of affordability?
- Does micro housing provide affordable housing for these groups?

Without being able to answer these questions conclusively, we suggest assigning persons in the educational stage and senior citizens to the group affected by housing affordability problems. In the case of those in employment, there is a need to socially negotiate the affordability requirements, especially for temporary demands. We argue that it is necessary to distinguish between demand for main or secondary residences and temporary or permanent housing demand. Planners and policy makers should take into account that unmet permanent demand induces temporary demand when housing is rented for orientation in the market. We also formulate the hypothesis that micro housing hardly contributes to affordable housing for people in the educational stage. Micro units seem to address more affluent students. To validate this hypothesis, further areas of study should be analysed.

The comparison of the ratio approach applied the European Union and residual income approach shows that the variation in results are smaller when used for micro housing than for larger households. Nevertheless, they vary widely in some income areas where the ratio approach tends to overestimate affordability problems.

We see an urgent need for research in the demand patterns for short-term renting. Further research should be conducted on the quantitative effects of, say, multilocality or flexible employment on housing demand. Since micro housing is currently primarily based on temporary demand, quantitative approximations to the dimension of the demand group represent an important basis for assessing from a municipal perspective.

As a result of the focus on temporary demand groups, potential benefits of micro housing are not exploited. For the future of urban housing, we consider concepts of long-term micro housing as an interesting component, although it remains to be seen whether such concepts can establish themselves on the market.

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