# A Cross-Sectional Analysis of Career Choice and Career mobility among Chinese Pharmacy Graduates

## Sofia Bergström[1]*, Nils Andersson[1]

[1]Department of Social Pharmacy and Public Health, Faculty of Pharmacy, Uppsala University, Uppsala, Sweden.

*E-mail ✉ sofia.bergstrom@gmail.com

## Abstract

This research explores the employment patterns and professional transitions among pharmacy alumni in China, with the goal of tackling issues related to workforce sustainability and guidance in the field. Amid the swift growth of China's health services industry, it is essential to examine elements that affect occupational shifts and professional selections to promote staff retention and advancement. The investigation includes individuals who pursued pharmacy studies at Kunming Medical University between 1996 and 2012. In April 2022, an internet-based cross-sectional questionnaire gathered responses from 231 participants, emphasizing personal details, professional paths, occupational transitions, and determinants of those choices. Statistical evaluation involved multivariate logistic regression models alongside Chi-square ($\chi^2$) analyses, particularly examining areas such as pharmacy practice, pharmaceutical research, and clinical pharmacy.

Among the 231 participants, 52.4% (n = 121) reported no occupational shifts, while 32.5% (n = 75) indicated one or two changes. Most favored positions in public sector organizations (n = 146, 63.2%), compared to local pharmaceutical companies (n = 48, 20.8%) or international ones (n = 20, 8.7%). Compensation levels and opportunities for self-development emerged as key influencers of transitions (p < 0.05). Those with three or more shifts showed stronger prioritization of self-development (Relative Risk Ratio [RRR]: 2.96; 95% Confidence Interval [CI]: [1.6, 5.49]). The findings highlight notable differences in professional transitions and selections among pharmacy alumni in China. Individuals employed in public organizations exhibited reduced transition rates, whereas higher rates appeared in pharmaceutical firms and unrelated fields. Primary influencers included compensation, self-development, and workplace conditions.

**Keywords:** Pharmacy, Career choice, Career mobility, Job changes, China

## Introduction

Within the dynamic field of health services, pharmacists are vital for promoting appropriate medication usage and patient safety [1]. Numerous investigations have explored determinants of professional selections—here referring to selected positions, functions, or employers—and professional transitions in various health disciplines, including pharmacy [2, 3]. Evidence indicates that

fulfillment at work, remuneration, and prospects for advancement play major roles in shaping professional trajectories among health workers. For instance, family physicians experiencing greater fulfillment report lower exhaustion, reduced fatigue, higher involvement, and extended tenure [4]. Moreover, remuneration stands out as an important element, where attractive pay and benefits correlate positively with sustained employment and dedication [5].

In the pharmacy domain, aspects like workplace atmosphere, progression opportunities, and employment stability substantially impact professional transitions [6, 7]. Yet, waning enthusiasm for pharmacy careers has sparked worries, linked mainly to restricted independence, monotonous duties, and insufficient satisfaction in numerous roles [8].

Professional transitions, described as the rate and probability of shifting roles within or across employers, have gained attention in research on staff retention and contentment [9]. Repeated shifts may interrupt service delivery, cause operational issues, and complicate staffing strategies, especially in pharmacy where expert knowledge and background are crucial [10]. Grasping the reasons and frequency of pharmacists' shifts is key to boosting fulfillment and securing a consistent workforce [11, 12].

In China's reforming health system, professional selections and transitions for pharmacy alumni warrant special attention. Professional selections involve particular functions, employers, or industries chosen, whereas transitions concern the frequency and motivations for altering them. Rising needs for skilled pharmacists stem from efforts to enhance service quality and maintain workforce balance [13, 14]. Still, research specifically on Chinese pharmacy alumni's professional transitions remains scarce, with prior work often centering on clinical staff or general health areas rather than pharmacy [15].

Earlier research on transitions in health fields points to influences like work fulfillment, equilibrium between professional and personal life, and advancement possibilities [12, 16, 17]. In fast-expanding areas such as pharmacy, workers frequently pursue options offering more independence, improved pay, or rewarding settings [11, 18]. Elements affecting shifts encompass remuneration, geographic placement, self-development, workplace atmosphere, policies, and travel duration. These linked aspects influence contentment, transitions, and retention, underscoring the value of specific approaches for workforce steadiness.

The objective of this research is to assess elements affecting occupational shifts and professional selections in Chinese pharmacy alumni. Through examining links among personal traits, employer categories, shift frequency, and decision influencers, the work offers perspectives on pharmacists' professional transitions. These insights can support staffing strategies and guide policies on professional growth in China's pharmacy sector.

**Materials and Methods**

*Study design*
This study received registration and ethical approval from Kunming Medical University (Reference No:

KMMU2022MEC201). To develop a questionnaire exploring pharmacy graduates' career choices and career mobility, a literature review was first conducted. The draft questionnaire was subsequently reviewed by three pharmacy practitioners and experts, who provided guidance on content and wording. Following this, a pilot test was carried out with ten randomly selected pharmacy graduates to determine whether any modifications were required.

The survey was conducted online, beginning with a brief introductory paragraph that informed participants that their participation was voluntary, that completion was not mandatory, and that the data would be used solely for research purposes. The survey link was distributed via WeChat to pharmacy graduates from Kunming Medical University who had enrolled between 1996 and 2012. To ensure data integrity, the online form required all questions to be completed before submission. The questionnaire comprised three sections.

The first section collected demographic information, including age, gender, year of graduation, current employment status, total years of work experience, and whether the participant was employed in a pharmacy-related role. The second section focused on employment conditions and job characteristics, such as current job category, workplace type, salary range, job satisfaction, and frequency of job changes. The third section consisted of seven questions assessing the influence of various subjective factors on career decisions, using a 5-point Likert scale (1 = not important at all; 2 = not important; 3 = neutral; 4 = important; 5 = very important).

*Key terms*
Several key terms were used in this study and are defined as follows:

- Major: A specific area of academic concentration within pharmacy education, comprising a structured set of courses designed to provide specialized knowledge. Common pharmacy majors include pharmacy practice (clinical and patient care focus), pharmaceutical sciences (drug development and research), and clinical pharmacy (collaborating with healthcare teams to optimize patient medication use).

- Clinical Pharmacy: A field centered on patient care, where pharmacists work alongside healthcare professionals to optimize medication regimens, ensuring treatments are safe, effective, and personalized.

- Research and Teaching: Positions primarily within academic or research institutions, involving either conducting research or providing educational instruction.
- Pharmaceutical Care: Roles in hospitals, community pharmacies, or other healthcare settings where pharmacists oversee appropriate medication use and ensure patient well-being. Graduates of pharmaceutical practice or clinical pharmacy are typically prepared for these roles.
- Pharmaceutical Sales: Positions focused on marketing and selling pharmaceutical products, usually within commercial settings or pharmaceutical companies.
- Pharmaceutical Production: Roles related to the manufacturing, formulation, and processing of drugs in production facilities.
- Pharmaceutical Administration: Positions involved in regulatory, administrative, or compliance functions within the pharmaceutical sector, often in government agencies or regulatory bodies.
- Other Pharmaceutical-related Work: Any pharmacy-related role not included in the above categories.
- Other Non-Pharmaceutical Work: Occupations outside the pharmaceutical or healthcare fields.
- Domestic Pharmacy Enterprise: Privately owned pharmaceutical companies operating within the country, engaged in activities such as research, production, marketing, or distribution of pharmaceutical products.
- Overseas Pharmacy Enterprise: International pharmaceutical organizations or multinational corporations involved in drug development, production, and global distribution.
- Others: Any organizations or institutions not classified in the categories above, including NGOs, freelance work, or employment in non-pharmacy sectors.

*Data collection*

Data were collected in April 2022. To mitigate potential outcome bias—where recent graduates might lack sufficient post-graduation experience to accurately assess job adaptation or career transitions—only individuals who had graduated at least 10 years prior were included. For broad representation, graduation cohorts were stratified into four periods: 1996–2000, 2001–2005, 2006–2009, and 2010–2012, the latter reflecting the marked rise in pharmacy program enrollments after 2010. Participants were pharmacy graduates from three majors (pharmacy practice, pharmaceutical sciences, and clinical pharmacy). Using the unique student ID assigned during enrollment, 10 graduates per cohort were randomly selected from each major. If a selected individual could not be reached, the next sequential ID was contacted as a replacement.

The survey, administered via the online platform Wenjuanxing, was sent to 240 potential respondents: 170 from pharmacy practice (spanning 1996–2012), 40 from pharmaceutical sciences (2009–2012), and 30 from clinical pharmacy (2010–2012). After excluding three who declined participation and six with invalid responses (completion time under 40 seconds or identical selections for five consecutive items), 231 valid questionnaires remained, yielding a response rate of 96.25%.

Sample adequacy was evaluated using G*Power 3.1 with chi-square ($\chi^2$) goodness-of-fit tests, resulting in a type I error probability below 0.01, supporting the robustness of the study design [19, 20]. The questionnaire items assessing factors influencing career choices showed satisfactory reliability, with a Cronbach's alpha of 0.72, indicating acceptable internal consistency. Construct validity for the 7-item scale was confirmed by a Kaiser-Meyer-Olkin Measure of Sampling Adequacy (MSA) of 0.71, exceeding the conventional threshold of 0.5 and verifying the data's suitability for factor analysis

**Table 1.** Frequency of job changes by occupational category

| Occupational Category | ≥ 3 Job Changes (%) | 1–2 Job Changes (%) | No Job Changes (%) | Total (%) | *P*-value | Test Statistic |
|---|---|---|---|---|---|---|
| Scientific Research and Teaching | 3 (8.6%) | 7 (9.3%) | 19 (15.7%) | 29 (12.5%) | < 0.001*** | $\chi^2$ (12 df) = 43.68 |
| Pharmaceutical Sales | 10 (28.6%) | 7 (9.3%) | 2 (1.7%) | 19 (8.2%) | | |
| Pharmaceutical Care | 8 (22.9%) | 40 (53.3%) | 65 (53.7%) | 113 (48.9%) | | |
| Pharmaceutical Production | 0 (0.0%) | 4 (5.3%) | 1 (0.8%) | 5 (2.2%) | | |
| Pharmaceutical Administration | 1 (2.9%) | 5 (6.7%) | 8 (6.6%) | 14 (6.1%) | | |

| | | | | |
|---|---|---|---|---|
| Other Non-Pharmaceutical-Related Work | 11 (31.4%) | 10 (13.3%) | 19 (15.7%) | 40 (17.3%) |
| Other Pharmaceutical-Related Work | 2 (5.7%) | 2 (2.7%) | 7 (5.8%) | 11 (4.8%) |

*p = 0.05; **p = 0.01; ***p = 0.001;

*Statistical methods*
Data analysis was performed with the R software version 4.2.1, utilizing the epiDisplay, ggplot2, and nnet packages. Categorical variables were summarized using counts and proportions. Associations involving descriptive factors from the survey were assessed via chi-square tests. To explore differences in job mobility and key career preferences among participants, multivariable logistic regression models were applied. Fisher's exact test was employed for evaluating relationships between categorical variables when cell counts were low. Findings were deemed significant if the p-value was below 0.05.

*Findings*
*Participant profile*
Demographic details of the graduates are displayed in **Table 2**. The study comprised 231 respondents, consisting of 161 individuals (69.7%) from pharmacy practice programs, 40 (17.3%) from pharmaceutical sciences, and 30 (13.0%) from clinical pharmacy. More than half of the participants (121, representing 52.4%) reported no job changes throughout their careers, whereas 75 (32.5%) had switched positions one or two times, and 35 (15.1%) had done so three or more times. Roughly half of the graduates in each field indicated no history of job switching: specifically, 87 (54.0%) of the 161 pharmacy practice alumni, 19 (47.5%) of the 40 pharmaceutical sciences alumni, and 15 (50.0%) of the 30 clinical pharmacy alumni. These figures indicate the share within each program who remained in the same job. Regarding graduation cohorts, 40 participants (17.3%) completed their studies from 1996 to 2000, 44 (19.0%) from 2001 to 2005, 53 (22.9%) from 2006 to 2009, and 94 (40.7%) from 2010 to 2012. Females made up 69.7% of the sample (161 individuals). The largest age group was 30–35 years, encompassing 86 respondents (37.2%).

**Table 2.** Frequency of job changes according to demographic characteristics of pharmacy graduates

| Demographic Characteristics | Total n (%) | ≥3 Job Changes n (%) | 1–2 Job Changes n (%) | No Job Changes n (%) | P-value | Test Statistic |
|---|---|---|---|---|---|---|
| **Gender** | | | | | | |
| Male | 70 (30.3%) | 11 (15.7%) | 22 (31.4%) | 37 (52.9%) | 0.067 | $\chi^2$ (2 df) = 4.98 |
| Female | 161 (69.7%) | 24 (14.9%) | 53 (32.9%) | 84 (52.2%) | 0.068 | $\chi^2$ (2 df) = 5.83 |
| **Age Group (years)** | | | | | | |
| 40–45 | 49 (21.2%) | 8 (16.3%) | 8 (16.3%) | 33 (67.3%) | 0.041* | $\chi^2$ (2 df) = 6.10 |
| 35–40 | 47 (20.3%) | 7 (14.9%) | 19 (40.4%) | 21 (44.7%) | 0.126 | $\chi^2$ (2 df) = 4.54 |
| 30–35 | 86 (37.2%) | 15 (17.4%) | 27 (31.4%) | 44 (51.2%) | 0.077 | $\chi^2$ (2 df) = 4.41 |
| 25–30 | 49 (21.2%) | 5 (10.2%) | 21 (42.9%) | 23 (46.9%) | 0.026* | $\chi^2$ (2 df) = 7.05 |
| **Major** | | | | | | |
| Pharmacy Practice | 161 (69.7%) | 27 (16.8%) | 47 (29.2%) | 87 (54.0%) | 0.073 | $\chi^2$ (2 df) = 5.12 |
| Pharmaceutical Sciences | 40 (17.3%) | 6 (15.0%) | 15 (37.5%) | 19 (47.5%) | 0.117 | Fisher's Exact Test |

| | | | | | | |
|---|---|---|---|---|---|---|
| Clinical Pharmacy | 30 (13.0%) | 2 (6.7%) | 13 (43.3%) | 15 (50.0%) | 0.036 | Fisher's Exact Test |
| **Enrollment Period (Years)** | | | | | | |
| 1996–2000 | 40 (17.3%) | 9 (22.5%) | 6 (15.0%) | 25 (62.5%) | 0.065 | Fisher's Exact Test |
| 2001–2005 | 44 (19.0%) | 5 (11.4%) | 15 (34.1%) | 24 (54.5%) | 0.056 | $\chi^2$ (2 df) = 6.44 |
| 2006–2009 | 53 (22.9%) | 9 (17.0%) | 21 (39.6%) | 23 (43.4%) | 0.159 | $\chi^2$ (2 df) = 3.89 |
| 2010–2012 | 94 (40.7%) | 12 (12.8%) | 33 (35.1%) | 49 (52.1%) | 0.051 | $\chi^2$ (2 df) = 9.63 |
| **Currently in Pharmacy-Related Work** | | | | | | |
| Yes | 182 (78.8%) | 23 (12.6%) | 64 (35.2%) | 95 (52.2%) | 0.035* | $\chi^2$ (2 df) = 7.30 |
| No | 49 (21.2%) | 12 (24.5%) | 11 (22.4%) | 26 (53.1%) | 0.25 | $\chi^2$ (2 df) = 2.98 |
| **Years of Work Experience** | | | | | | |
| 21–26 | 13 (5.6%) | 5 (38.5%) | 1 (7.7%) | 7 (53.8%) | 0.182 | Fisher's Exact Test |
| 15–20 | 50 (21.6%) | 6 (12.0%) | 13 (26.0%) | 31 (62.0%) | 0.022* | $\chi^2$ (2 df) = 6.84 |
| 9–14 | 64 (27.7%) | 13 (20.3%) | 23 (35.9%) | 28 (43.8%) | 0.229 | $\chi^2$ (2 df) = 3.09 |
| 3–8 | 91 (39.4%) | 8 (8.8%) | 35 (38.5%) | 48 (52.7%) | 0.011* | $\chi^2$ (2 df) = 9.91 |
| <3 | 13 (5.6%) | 3 (23.1%) | 3 (23.1%) | 7 (53.8%) | 0.324 | Fisher's Exact Test |
| **Overall Total** | 231 (100%) | 35 (15.1%) | 75 (32.5%) | 121 (52.4%) | 0.052 | $\chi^2$ (2 df) = 5.87 |

*$p = 0.05$; **$p = 0.01$; ***$p = 0.001$

Notable variations in job mobility patterns were observed among participants depending on their current involvement in pharmacy-related positions and their age categories. Further statistical evaluation focused on the duration of professional experience. A clear association emerged in job-change rates when comparing individuals with 15–20 years of experience to those with 3–8 years, as revealed by chi-square testing across experience brackets. These analyses yielded significant results for the 15–20-year cohort ($p = 0.022$) and the 3–8-year cohort ($p = 0.011$), highlighting that years in the workforce influenced the propensity for changing jobs.

*Professional pathways of graduates*
Information regarding participants' employment settings, professional roles, and income levels is presented in Tables 3, 1, and 4. The largest proportion of alumni opted for roles within public-sector organizations, such as state hospitals, local health facilities, academic institutions, and administrative bodies (146 individuals; 63.2%). This was followed by positions in local pharmaceutical companies (48; 20.8%) and international pharmaceutical firms (20; 8.7%). The remaining participants (17; 7.4%) were self-employed, worked outside the pharmacy field, or operated under flexible, non-exclusive employment arrangements—typically meaning no formal affiliation or binding contract with a single employer.

Chi-square analysis detected a highly significant relationship between workplace category and job-change frequency ($p < 0.001$), confirming that employment sector strongly predicted job mobility. Among those who

reported no career transitions, most were employed in public institutions (96; 79.3%). In contrast, job turnover was substantially greater in the pharmaceutical industry sector. Within this group, only 12.4% (n = 15) had remained in the same job, while 38.7% (n = 29) had

switched positions one or two times, and 68.5% (n = 24) had done so three or more times—demonstrating markedly elevated job-change rates relative to other employment types.

**Table 3.** Job-change frequency according to workplace type

| Workplace Type | ≥3 Job Changes n (%) | 1–2 Job Changes n (%) | No Job Changes n (%) | Total n (%) | P-value | Test Statistic |
|---|---|---|---|---|---|---|
| Governmental Institutions | 8 (22.9%) | 42 (56.0%) | 96 (79.3%) | 146 (63.2%) | <0.001*** | χ² (12 df) = 53.49 |
| Overseas Pharmacy Enterprise | 9 (25.7%) | 8 (10.7%) | 3 (2.5%) | 20 (8.7%) | | |
| Domestic Pharmacy Enterprise | 15 (42.8%) | 21 (28.0%) | 12 (9.9%) | 48 (20.8%) | | |
| Other Categories | 3 (8.6%) | 4 (5.3%) | 10 (8.3%) | 17 (7.4%) | | |

*p = 0.05; **p = 0.01; ***p = 0.001

**Table 4.** Job-change frequency according to salary range

| Salary Range (US$) | Total n (%) | ≥3 Job Changes n (%) | 1–2 Job Changes n (%) | No Job Changes n (%) | P-value | Test Statistic |
|---|---|---|---|---|---|---|
| 245–735 | 14 (6.1%) | 2 (5.7%) | 7 (9.3%) | 5 (4.1%) | 0.001*** | χ² (10 df) = 28.77 |
| 735–1176 | 98 (42.4%) | 11 (31.4%) | 33 (44.0%) | 54 (44.6%) | | |
| 1176–2500 | 94 (40.7%) | 11 (31.4%) | 25 (33.3%) | 58 (47.9%) | | |
| 2500–4411 | 10 (4.3%) | 4 (11.4%) | 4 (5.3%) | 2 (1.7%) | | |
| 4411–5882 | 6 (2.6%) | 2 (5.7%) | 3 (4.0%) | 1 (0.8%) | | |
| 5882–8823 | 9 (3.9%) | 5 (14.3%) | 3 (4.0%) | 1 (0.8%) | | |

*p = 0.05; **p = 0.01; ***p = 0.001 US$: United States dollars

The majority of participants were employed in pharmaceutical care (n = 113; 48.9 percent), whereas the next largest segment held positions unrelated to pharmacy, comprising 17.3 percent (n = 40), including roles such as lawyers, 5G technology staff, flight attendants, a security consultant, and self-employed individuals. Interestingly, despite the availability of a pharmaceutical sciences major at the institution, only 2.2 percent of respondents were working in pharmaceutical production. A χ² test indicated a significant difference in job-change frequency across occupational categories (p < 0.001), suggesting that the propensity to switch jobs varied notably by field. Among those who had never changed jobs or had done so only once or twice, 53.7 percent (n = 65) and 53.3 percent (n = 40), respectively, were employed in pharmaceutical care. Careers outside pharmacy showed a higher tendency for job changes (n = 11 of 35; 31.4%), followed by pharmaceutical sales positions (n = 10 of 35; 28.6%). Additionally, another χ² test (p = 0.001) demonstrated a significant link between salary level and job-change frequency, with the majority

of respondents (n = 98; 42.4 percent) earning between 735–1176 US$ per month. Higher earners (2500–8823 US$) tended to switch jobs more frequently, with 14.3 percent (n = 5) of those making 5882–8823 US$ reporting three or more job changes, compared to only 0.8% (n = 1) who had never changed jobs.

Regarding factors influencing career decisions, income emerged as the top priority, receiving a mean score of 4.1 (IQR: 4–5) on a 5-point Likert scale, followed by opportunities for personal growth and the work environment (mean: 3.9, IQR: 3–5). Regional preferences, such as favoring developed cities or one's hometown, had the least influence (mean: 3.5, IQR: 3–4).

Logistic regression analysis **(Table 5)** examined the association between job-change frequency and the importance of these factors, using respondents who had never changed jobs as the reference group. Individuals who had changed jobs once or twice placed greater emphasis on income (Relative Risk Ratio [RRR]: 1.62; 95 percent CI: 1.05–2.49) but were less influenced by

location (RRR: 0.74; 95 percent CI: 0.55–0.99). Those who had switched jobs three or more times prioritized personal growth (RRR: 2.96; 95 percent CI: 1.6–5.49), while the work environment was less of a concern (RRR: 0.55; 95 percent CI: 0.31–0.98).

**Table 5.** Factors influencing graduates' job-change decisions

| Factor | 1–2 Job Changes | | ≥3 Job Changes | |
|---|---|---|---|---|
| | Coefficient / SE | RRR (95% CI) | Coefficient / SE | RRR (95% CI) |
| Intercept | -1.69 / 1.124 | – | -4.36 / 1.563** | – |
| Income | 0.48 / 0.22* | 1.62 (1.05–2.49) | 0.09 / 0.269 | 1.10 (0.65–1.86) |
| Regional Preference | -0.30 / 0.149* | 0.74 (0.55–0.99) | 0.04 / 0.212 | 1.04 (0.69–1.58) |
| Personal Growth | 0.18 / 0.189 | 1.20 (0.83–1.74) | 1.09 / 0.315*** | 2.96 (1.60–5.49) |
| Interest Alignment | -0.05 / 0.204 | 0.95 (0.64–1.42) | -0.08 / 0.259 | 0.93 (0.56–1.54) |
| Work Environment | 0.22 / 0.240 | 1.24 (0.78–1.99) | -0.60 / 0.297* | 0.55 (0.31–0.98) |
| Law and Regulation | -0.09 / 0.201 | 0.92 (0.62–1.36) | 0.15 / 0.285 | 1.16 (0.66–2.02) |
| Commuting Time | -0.22 / 0.194 | 0.80 (0.55–1.17) | 0.02 / 0.270 | 1.02 (0.60–1.74) |

$*p = 0.05$; $**p = 0.01$; $***p = 0.001$; reference category: no job change; residual deviance = 425.86

*Notes:*
- Coefficient / SE indicates the regression coefficient along with its standard error, reflecting both the strength and precision of the effect.
- RRR (95% CI) represents the Relative Risk Ratio and its 95% confidence interval, indicating the likelihood of a job-change outcome relative to the reference group with 95% certainty

*Career choices and job-change frequency in high-income graduates*
This research gathered data on the earnings of participants across various professions. Given that salary plays a key role in professional decisions, further analysis explored the connection between professional fields and the rate of job transitions among those earning higher incomes. Based on the 2022 China Statistical Yearbook, which reported a per capita GDP of US$12,600 for China in 2021, monthly earnings exceeding US$1,176 were defined as high income in this analysis. The findings from this subgroup are displayed in **Table 6**. Fisher's exact tests indicated that high-earning individuals employed in pharmaceutical care or in roles unrelated to pharmaceuticals tended to change jobs less frequently (p = 0.002 and p = 0.021, respectively) compared to those in pharmaceutical sales (p = 0.018).

**Table 6.** Frequency of career transitions among graduates with high earnings across various professional fields

| Occupation | 3 or more job changes (%) | 1–2 job changes (%) | No job changes (%) | p-value |
|---|---|---|---|---|
| Scientific Research and Teaching | 2 (3.2%) | 1 (1.6%) | 9 (14.5%) | 0.494 |
| Pharmaceutical Care | 3 (4.8%) | 12 (19.4%) | 34 (54.8%) | 0.002** |
| Pharmaceutical Production | 0 (0.0%) | 3 (4.8%) | 1 (1.6%) | 0.090 |
| Pharmaceutical Sales | 8 (12.9%) | 7 (11.3%) | 1 (1.6%) | 0.018* |
| Pharmaceutical Administration | 1 (1.6%) | 3 (4.8%) | 1 (1.6%) | 0.192 |
| Non-Pharmaceutical-Related Roles | 7 (11.3%) | 7 (11.3%) | 14 (22.6%) | 0.021* |
| Other Pharmaceutical-Related Roles | 1 (1.6%) | 2 (3.2%) | 2 (3.2%) | 0.324 |

$*p = 0.05$; $**p = 0.01$; $***p = 0.001$

The increasing intake of undergraduate pharmacy students in China has led to a steady rise in pharmacy graduates entering the workforce [21, 22]. Despite this growth, previous research has not adequately explored the employment status, job selection factors, or frequency of job changes among pharmacy majors [23, 24]. This cross-sectional study sheds light on the career paths and mobility patterns of Chinese pharmacy

graduates, offering new insights into their professional trajectories.

Female graduates were more represented in the sample, reflecting a global trend of growing female participation in pharmacy [25, 26]. When examining career preferences, most respondents favored positions in government institutions, especially public hospitals and community health centers, likely due to perceived job stability, structured opportunities for advancement, and access to professional development resources [26]. Fewer graduates opted for roles in domestic or international pharmaceutical companies, possibly reflecting differences in work conditions, organizational culture, and long-term career prospects. This contrasts with trends in developed countries, where industry roles are often more attractive due to higher compensation and enhanced research and innovation opportunities [27, 28]. Occupational distribution revealed that graduates in pharmaceutical care tended to remain in their positions longer, while those in pharmaceutical sales frequently changed jobs. High turnover in sales roles may be influenced by centralized drug procurement policies and performance-based expectations [29].

Several factors emerged as influential in shaping career choices and mobility. Income was a significant determinant, with higher earnings correlating with reduced likelihood of job changes, supporting previous findings that financial incentives strongly impact healthcare professionals' career decisions [30]. Graduates who switched jobs repeatedly highlighted personal growth as a key driver, emphasizing the importance of professional development and advancement opportunities in retaining talent. Similar studies on pharmacist attrition have identified career stagnation and lack of growth opportunities as major contributors to job dissatisfaction and turnover [12].

The findings suggest practical implications for workforce management and policy. Establishing supportive work environments, offering continuous professional development, and providing competitive compensation may help reduce turnover and promote long-term engagement. Supporting this, research in Romania indicated that higher income increased job satisfaction [11], and Almaghaslah and Alsayari reported that salary and career advancement were major motivators for medical representatives to pursue pharmaceutical sales roles [31].

This study has limitations. The sample of 231 graduates, although diverse in terms of major, enrollment year, age,

and gender, may not fully represent the broader population, particularly regarding job-change patterns. The cross-sectional design also captured data at a single point in time, limiting the ability to assess trends over time. Finally, a scarcity of national and international literature on pharmacy graduates' career mobility hindered comparative analysis, meaning findings may be most applicable to contexts with similar sociocultural characteristics.

**Conclusion**

Chinese pharmacy graduates exhibit diverse career trajectories and job mobility patterns, with clear distinctions across occupational sectors. Graduates in governmental institutions generally demonstrated lower turnover, whereas those in pharmaceutical companies and other non-clinical roles experienced more frequent job changes. Income and opportunities for personal development emerged as primary factors influencing career decisions, with income being particularly decisive. These insights underscore the importance of strategic workforce planning and targeted interventions to support retention and manage mobility challenges in the pharmacy profession.

**References**

1. Wang CY, Li MZ, Huang YK, Xi XY. Factors influencing clinical pharmacists' integration into the clinical multidisciplinary care team. Front Pharmacol. 2023;14.
2. Liaw SY, Wu LT, Chow YL, Lim S, Tan KK. Career choice and perceptions of nursing among healthcare students in higher educational institutions. Nurse Educ Today. 2017;52:66–72.
3. Childs-Kean LM, Bhatt S, Egelund EF. Factors influencing career paths in Infectious Disease and/or HIV pharmacy: an exploratory study of pharmacy school graduates. Pharm Educ. 2021;21(1):577–81.

4.  Le Floch B, Bastiaens H, Le Reste JY, Nabbe P, Le Floch P, Cam M, et al. Job satisfaction criteria to improve general practitioner recruitment: a Delphi consensus. Fam Pract. 2022;41(4):554–63.

5.  Liu SM, Li SP, Li YJ, Wang HP, Zhao JJ, Chen G. Job preferences for healthcare administration students in China: a discrete choice experiment. PLoS ONE. 2019;14(1).

6.  Wilby KJ, Rainkie DC. Global comparison of professional positioning by pharmacy programs towards prospective students. Res Social Adm Pharm. 2020;16(12):1658–63.

7.  Smolina VA, Novokreshchenova IG, Novokreshchenov IV. Job satisfaction among pharmacists. Russian Open Med J. 2021;10(3).

8.  Steeb DR, Cain J, Haines ST. Reconsidering pharmacy: we need to turn Career Regret into Career options. Am J Pharm Educ. 2024;88(4).

9.  Hakim C. Labour mobility and employment stability. Rhetoric and reality on the sex differential in labour-market behaviour. Eur Sociol Rev. 1996;12(1):1–31.

10. Cohn A, Maréchal MA, Schneider F, Weber RA, FREQUENT JOB CHANGES CAN, SIGNAL POOR WORK ATTITUDE AND REDUCE EMPLOYABILITY. J Eur Econ Assoc. 2021;19(1):475–508.

11. Mullen R, Hassell K, Noyce P. Primary care pharmacist workforce mobility: why do pharmacists want to work in primary care and how do these reasons differ for community and hospital pharmacists? Int J Pharm Pract. 2005;13(4):281–8.

12. Aspden TJ, Silwal PR, Marowa M, Ponton R. Why do pharmacists leave the profession? A mixed-method exploratory study. Pharm Practice-Granada. 2021;19(2).

13. Li J, Xiao C, Hou J, Zhao Y, Gong H, Zhang B, et al. Clinical pharmacy undergraduate education in China: a comparative analysis based on ten universities' training programs. BMC Med Educ. 2023;23(1):83.

14. Lebovitz L, Eddington ND. Trends in the pharmacist workforce and Pharmacy Education. Am J Pharm Educ. 2019;83(1).

15. Tomo A, De Simone S. Using the job demands-resources approach to assess employee well-being in healthcare. Health Serv Manage Res. 2019;32(2):58–68. [

16. Le Floch B, Bastiaens H, Le Reste JY, Lingner H, Hoffman R, Czachowski S et al. Which positive factors give general practitioners job satisfaction and make general practice a rewarding career? A European multicentric qualitative research by the European general practice research network. BMC Fam Pract. 2019;20(1).

17. Baum T. Skills, training and development within an insular labour market the changing role of catering managers in the healthcare environment. J Manage Dev. 2007;26(2):132–47.

18. Hassell K. Destination, future intentions and views on practice of British-based pharmacists 5 and 10 years after qualifying. Pharm World Sci. 2006;28(3):116–22.

19. Kang H. Sample size determination for repeated measures design using G Power software. Anesth Pain Med. 2015;10(1):6–15.

20. Brysbaert M, Stevens M. Power Analysis and effect size in mixed effects models: a Tutorial. J Cognition. 2018;1(1):9.

21. DiPiro JT, Allen DD, Lin A, Scott SA, Sorensen TD, Maine LL. Impact of Social Forces and Environmental Factors on Healthcare and Pharmacy Education: the Report of the 2021–2022 AACP Argus Commission. Am J Pharm Educ. 2023;87(1):ajpe9452.

22. Lynn Crismon M, West-Strum DS, Dowling-McClay K, Drame I, Hastings TJ, Jumbo-Lucioni P, et al. The report of the 2021–2022 AACP Research and Graduate Affairs Committee. Am J Pharm Educ. 2023;87(1):ajpe9454.

23. Ives RC, Klein KC, Mason NA. Career and professional development services for pharmacy students. Currents Pharm Teach Learn. 2020;12(9):1110–5.

24. Alhomoud FK, AlGhalawin L, AlGofari G, AlDjani W, Ameer A, Alhomoud F. Career choices and preferences of Saudi Pharmacy undergraduates: A Cross Sectional Study. Saudi Pharm J. 2019;27(4):467–74.

25. Macias-Moriarity LZ, Sinclair SM, Walker D, Purnell M. Impostor phenomenon and grit as predictors of job satisfaction in female pharmacy Faculty. Pharm Res. 2023.

26. Liu P, Liu SM, Gong TT, Li Q, Chen G, Li SP. Job preferences of undergraduate pharmacy students in China: a discrete choice experiment. Hum Resour Health. 2021;19(1).

27. Arbab AH, Eltahir YAM, Elsadig FS, Yousef BA. Career preference and Factors Influencing Career Choice among undergraduate pharmacy students at University of Khartoum, Sudan. Pharmacy. 2022;10(1).

28. Alolga RN, Kassim SA, Dramou P. Study Destination Choice and Career Preferences of International Students at China Pharmaceutical University. Pharmacy. 2022;10(6).

29. Wang JL, Zhang SY, Wang CH, Li J, Wang R, Zhu L. The vacated space of volume/price of the drugs centralized procurement with quantity in secondary and above public hospitals of China. BMC Health Serv Res. 2024;24(1).

30. Scott A, Connelly LB. Financial incentives and the health workforce. Aust Health Rev. 2011;35(3):273–7.

31. Almaghaslah D, Alsayari A. A cross-sectional study on Saudi pharmacists working as medical representatives: what attracted them and what is keeping them in this sector—misconceptions and reality. Front Public Health. 2023;11.